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ABSTRACT

This manual is one of four self-contained components of a larger handbook designed to assist secondary and postsecondary instructors and support staff in meeting the needs of limited-English-proficiency (LEP) students in vocational training programs. Together with an accompanying set of vocational English as a second language (VESL) vocabulary cards, the guide not only provides essential technical vocabulary in automotive mechanics needed by the LEP vocational student to participate more confidently and successfully in training and on the job, but also suggests practical activities for using the vocabulary in a variety of settings. Chapters address these topics: the elements of memory, meaning, and motivation in vocabulary development; using the vocabulary flash cards; auto mechanics terminology; safety; and job skills. An auto mechanics vocabulary list, a resource list of additional teaching strategies for vocabulary development, an annotated bibliography, the VESL flash cards (printed five to a sheet), and several illustrations to go with the cards are appended. (MSE)

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ACTIVITIES FOR VESL VOCABULARY CARDS

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AUTO MECHANICS

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MESA COMMUNITY COLLEGE

MADE AVAILABLE THROUGH AN ARIZONA DEPARTMENT OF EDUCATION PROJECT FUNDED THROUGH VOCATIONAL DISADVANTAGED MONIES UNDER PL 94-482.

AUTOMOTIVE MECHANICS

HANDBOOK TO ACCOMPANY VESL VOCABULARY CARDS

GAIL SHAY
Materials Developer

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VESL CURRICULUM PROJECT
Mesa Community College

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Mr. John Lange, Deputy Superintendent for Vocational Education

Made available through an Arizona Department of Education project funded through Vocational Disadvantaged monies under PL 94-482.

JUNE 1984

The financial support for this handbook is provided by the Program Support Unit of the Arizona Department of Education through a project funded with Vocational Disadvantaged Monies under P.L. 94-9482.

The Program Support Unit in the Arizona Department of Education is the vehicle through which technical assistance and funding for vocational program development and improvement to serve individuals with limited English proficiency is provided. Because of limited availability of resources and funds, this unit has been organized to combine resources and vocational funding available through ADE (Disadvantaged, Handicapped, Guidance, Vocational Equity, Displaced Homemakers, and Support Services for Women) to serve special populations and provide support services to vocational students. The listing below shows the individuals responsible for the various areas:

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Please feel free to call on these individuals for technical assistance and program information.

PREFACE

The purpose of this handbook is to aid secondary and post-secondary instructors and support staff to meet the needs of limited English proficient (LEP) students in vocational training programs.

The handbook is an outgrowth of the concern for LEP vocational students who often experience language difficulty not only on the job, but in the vocational training classroom.

This handbook hopefully provides the essential technical vocabulary needed by the LEP vocational student to participate more confidently and successfully in training, and ultimately, on the job. In addition, the handbook suggests many practical activities for using the vocabulary in a variety of classroom settings.

The handbook is based on the premise that adults will effectively acquire a second language when:

. it is relevant to their immediate needs (a job);
. it is learner-centered; and
. ample practice and reinforcement are provided.

The handbook consists of four separately bound manuals:

. Activities for VESL Vocabulary Cards - Food Service
. Activities for VESL Vocabulary Cards - Computer Literacy
. Activities for VESL Vocabulary Cards - Automotive Mechanics
. Activities for VESL Vocabulary Cards - Nursing Assistant

We hope the handbook provides the needed information to implement quality vocational training for the LEP learner.

PREFACE

In compiling the handbook, we wish to acknowledge our indebtedness to others whose knowledge and effort made the endeavor possible.

- Mr. Stewart Miller
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- Ms. Trudy Rogers
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- Mr. Jim Purvis
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VOCABULARY: MEMORY, MEANING, MEMORIZATION

Control over vocabulary does not result from mere memorization of words, although that is one logical first step, especially for second language learners. Studying spelling and practicing pronunciation both contribute to communication, either oral or written, even though neither activity presumes knowledge of meaning on the part of the speaker or writer.

Neither can a learner depend entirely on his or her own limited vocabulary or syntax, since she/he will not always be just speaking or writing:

> "Listening and reading require a wider knowledge of vocabulary and grammar, since the learner cannot limit others' speech and writing to his or her own linguistic knowledge."
>
> Guntermann, 1982

Despite the different emphases for different vocational areas, students will need to address all the language modes (listening, speaking, reading, writing) to some extent.

Establishing meaning is a longer process than memorization, and to be truly effective it must be an active process on the learner's part. There are many ways to establish the meaning of vocabulary (Mrowicki and Dehesus, 1981):

1. objects
2. illustrations (photographs, drawings, slides, etc.)
3. context
4. actions
5. explanations (synonyms and definitions)
6. translation (native language)
7. oral stimulus, physical response
8. oral stimulus, oral or written response

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Many of these techniques will be utilized in the general suggestions and specific exercises for the four vocational areas included in this handbook.

In preparation for student vocabulary learning and practice, VESL teachers may want to pre-teach the following structures which appear with frequency in definitions:

- past participles used as adjectives (e.g. money spent, written promises)
- passive voice (is used to, is made by)
- gerund (preserving food, adding up, moving goods)
- infinitive to define verbs (e.g. delegate: to give a task to someone else to do)
- modals, especially can and must (can be divided, can be bent)

The final key to vocabulary learning is motivation on the part of the student. This can be achieved through the use of a variety of exercises to maintain interest, and through hands-on practice whenever possible. Motivation is enhanced for LEP students by the learning of useful and applicable knowledge, in this case occupation-specific vocabulary. Another way to keep motivation high is by having the student work along on exercises for which answers are provided for self-correction:

> "Prediction of meanings and verification of meanings by the use of dictionaries [Note: Here also the VESL vocabulary cards and answer keys for the exercises] are probably more crucial skills to develop than the skill of listening to explanations of words since it teaches students how they can be self-sufficient."
>
> Fanselow, 1980

cards with the same format as the existing cards.

4. It often helps to make flashcards with the term on one side and the definition on the other side. Just the practice of writing out words is very reinforcing for learning.

AUTO MECHANICS

AU-TO ME-CHAN-ICS

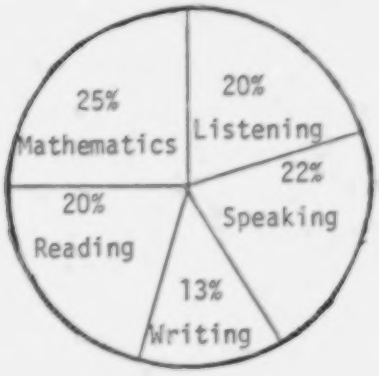
THE MAINTENANCE, DIAGNOSIS OF PROBLEMS, AND REPAIR OF AUTOMOBILES AND OTHER MOTOR VEHICLES

AUTO MECHANICS IS A USEFUL AND NECESSARY OCCUPATION.

Mechanic's helper is the entry level job in the field of auto mechanics. Actual vocational training time ranges from forty days to four months (assuming there is no English language problem). Physical demands of the job require stooping, crawling, reaching, handling, some lifting of heavy objects, and carrying things. Working conditions usually involve inside work, with considerable noise.[1]

From a language point of view, as shown in the following diagram (Salt Lake Skills Center, 1983), speaking is the most important skill for an auto mechanic, followed by listening and reading, with writing the least important.

PERCENTAGE ANALYSIS OF THE COMMUNICATION AND MATHEMATICS SKILLS REQUIRED OF AN ENTRY-LEVEL AUTO MECHANIC AND AUTO BODY WORKER



[1] Job Description adapted from Occupational Information System of Arizona User's Manual, 1981.

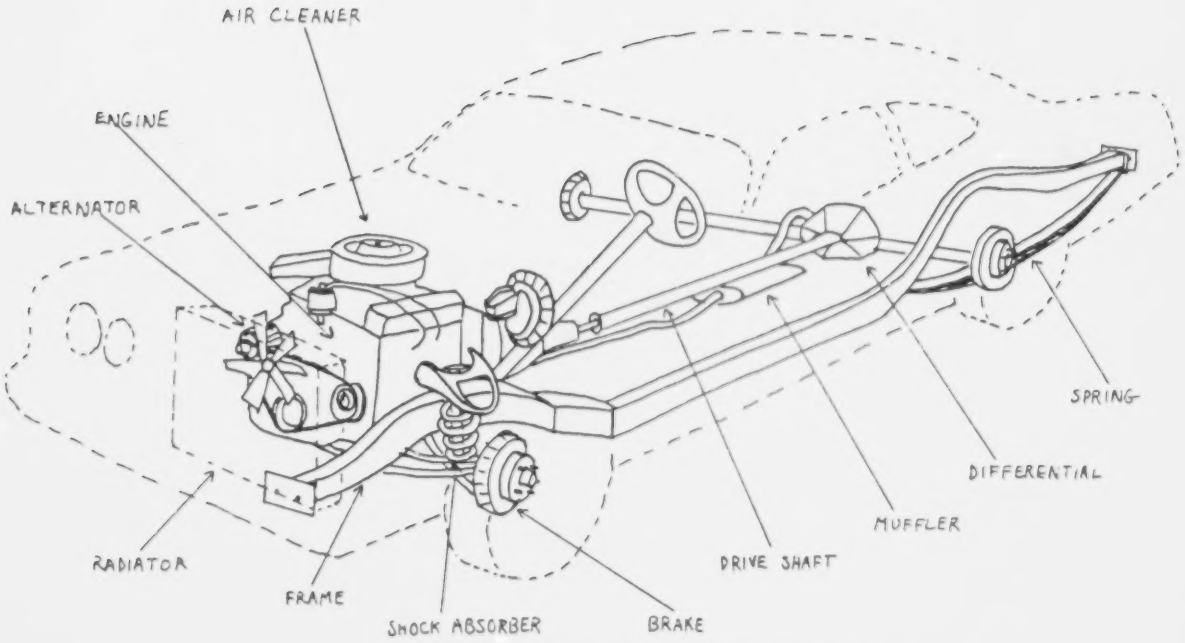
The Salt Lake Skills Center also rated the most important skills within these basic areas:

Reading: literal reading to find specific information or follow directions

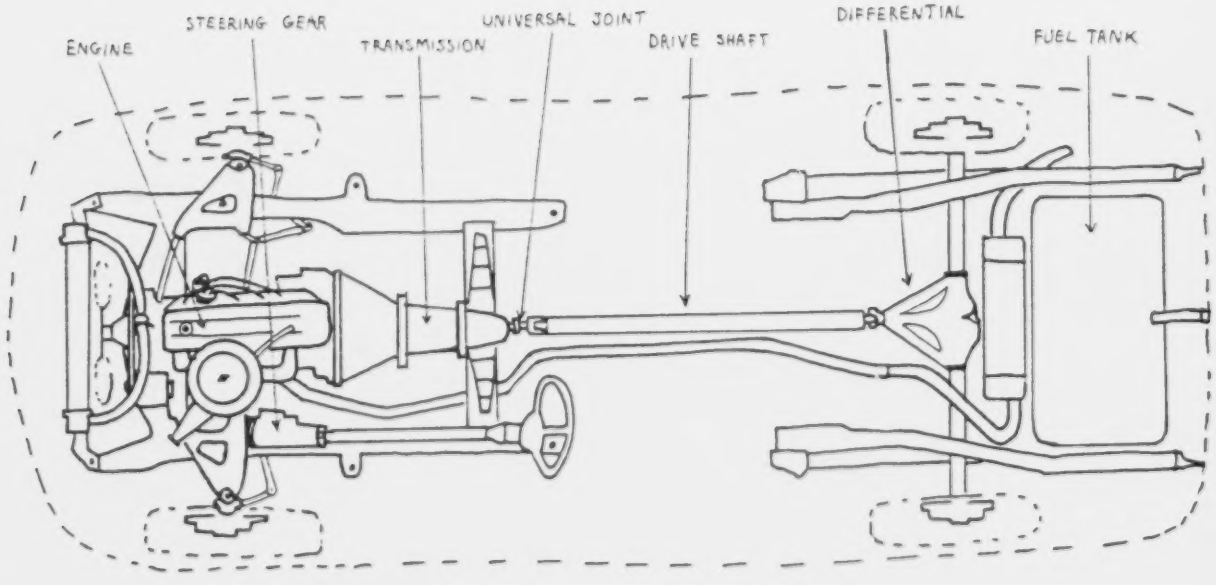
Listening: literal listening to facts in order to follow instructions, get information, respond to emergencies, and remember details

Speaking: pronouncing words clearly and correctly and using vocabulary that fits the situation

Writing: mechanics--using correct alphabetical order, spelling, punctuation, and neatness

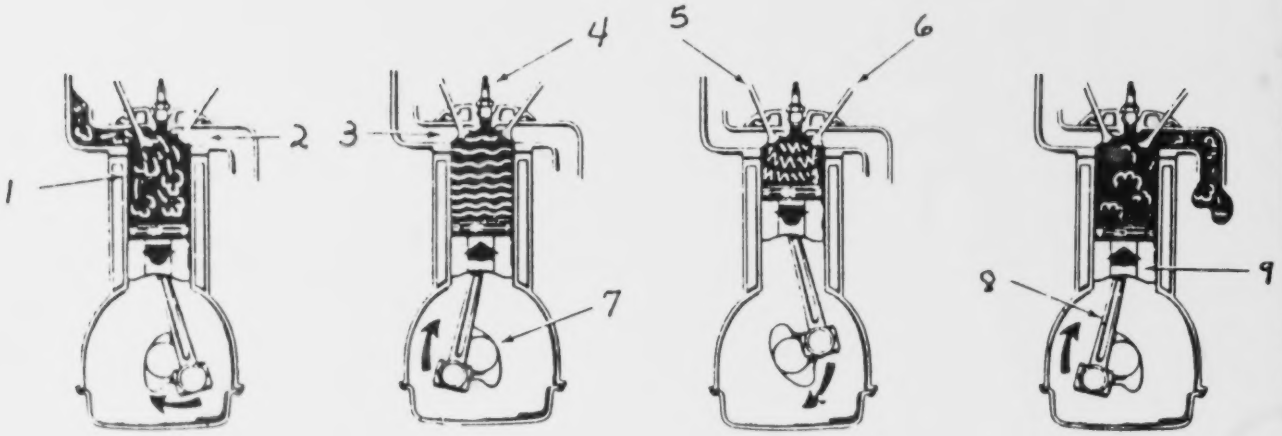


MAJOR COMPONENTS IN THE AUTOMOBILE



POWER TRAIN OF THE AUTOMOBILE

ENGINE STROKES AND PARTS
(COURTESY J. WILEY & SONS, 1981)



1. CYLINDER
2. EXHAUST PORT
3. INTAKE PORT
4. SPARK PLUG
5. INTAKE VALVE
6. EXHAUST VALVE
7. CRANKSHAFT
8. CONNECTING ROD
9. PISTON

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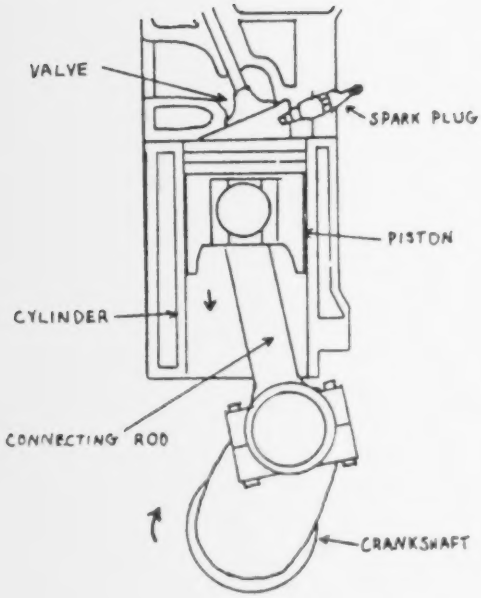
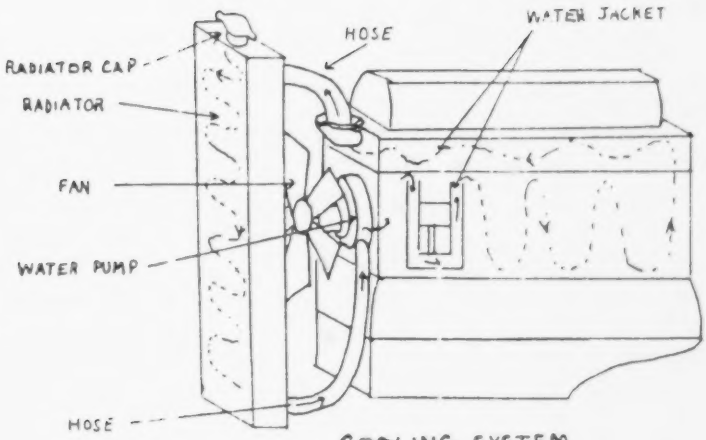
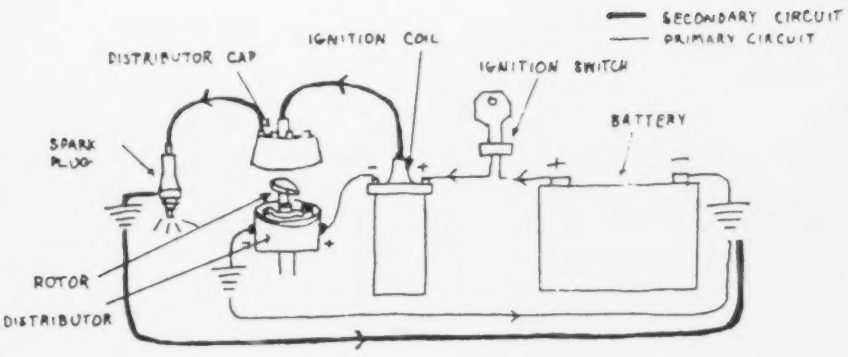


FOUR-STROKE CYCLE ENGINE



COOLING SYSTEM



IGNITION SYSTEM

I. Alphabetize the following words:

mount	pulley
reassemble	piston
reciprocating	muffler
overhaul	relay
motor	radiator

II. Pronunciation practice: Say the following words out loud to your teacher or a friend who speaks English well.

tachometer	hydraulic	reciprocating
align	circuit	torque
ignition	hazardous	sludge
gauge	vacuum	viscosity
axle	cylinder	throttle

III. Spelling practice: Fill in the missing vowels.

EXAMPLE:

e x h a u s t

1.	_ n t _ f r _ e z e	7.	c _ m m _ t a t _ r
2.	g _ n _ r _ t e	8.	r _ p a _ r
3.	e c c _ n t r _ c	9.	c _ n d _ n s _ r
4.	r e _ s s _ m b l _	10.	r e s _ s t _ n c e
5.	f l _ m m _ b l _	11.	t _ x _ c
6.	r _ t _ r	12.	_ m _ s s i _ n s

IV. Synonyms: Match the term with a word of similar meaning.

_____	generate	1.	change
1	adjust	2.	position
_____	hazardous	3.	examine
_____	check	4.	produce
_____	score	5.	part
_____	device	6.	fault
_____	toxic	7.	burning
_____	combustion	8.	twisting
_____	shield	9.	dangerous
_____	align	10.	fix
_____	defect	11.	scratch
_____	repair	12.	protect
_____	distortion	13.	poisonous

V. Put a check (✓) by the terms that are actions of an auto mechanic. Circle the terms that are names of (parts).

advance	fuel pump	flywheel
diagnose	shim	lubricate
overhaul	(generator)	solenoid
✓generate	recondition	clutch

VI. Many of the auto mechanics terms have different meanings outside of the auto mechanics area. For the words below:

A) Copy the auto mechanics vocabulary card definition;

B) Look up the common meaning in the dictionary. Write the common definition.

WORD	AUTO MECHANICS DEFINITION	COMMON DEFINITION
1. Vacuum:	A pressure less than the pressure of the atmosphere	to clean using a vacuum cleaner
2. Relay:		
3. Mount:		
4. Float:		
5. Charge:		
6. Service:		

VII. Word Search: THE BUSY MECHANIC. Find the words listed below. Words may be up, down, backward, forward, or diagonal.

R H K G T N C G R O D B L O I
B D K M K C G X L I W E L Z R
Z J T X Z J E L D E A W E C Y
[Y [C N F A P L U I P K L [
H J S T E T D B S G V W E Y B
G X L T S N M A Q N [C Y R Z
E R F N S E N J L M I E S A P
K C I U S U N O E I F S D R N
K M N S L T J P C X G V C Y E
T F A A Q M Y D B S A N Z V S
N E V V L R O T A N I C B Y S
R W B G C A P P C F H D [[I
S Y [O L K B E I E B H X K E
E G R A H C V K C M E I F [C
I G K M L M Y K U D O E Z E C

FIND THESE WORDS IN THE ABOVE PUZZLE :

ADJUST	ADVANCE	ALIGN
BALANCE	BLEED	✓CHARGE
CHECK	DISCONNECT	
INSPECT	INSTALL	
REASSEMBLE	REPAIR	

VIII. AUTOMOTIVE TOOLS - Multiple Choice:
Circle the correct name of the tool that is described.

1. A (hydrometer, tachometer, voltmeter) measures engine speed.
2. Use a (quick charger, voltmeter, tachometer) to charge a battery quickly.
3. The instrument that measures the amount of current flow in amperes is (an ohmmeter, a voltmeter, an ammeter).
4. To measure accurately to one thousanth of an inch, use a (voltmeter, dwellmeter, micrometer).
5. A (voltmeter, ammeter, ohmmeter) measures electrical pressure in volts.
6. The (tachometer, dwellmeter, ammeter) measures the time the ignition points are closed.
7. An instrument used for measuring the specific gravity of battery electrolyte is a (hydrometer, dwellmeter, ohmmeter).
8. An (ammeter, ohmmeter, voltmeter) measures resistance in ohms.

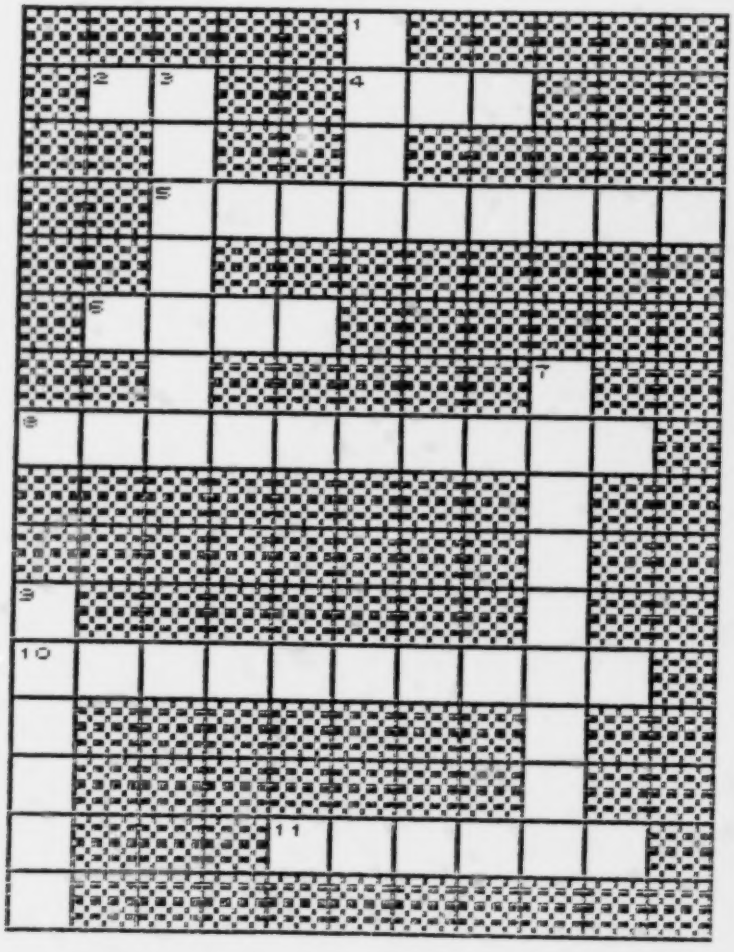
IX. Name three kinds of circuits:

1. _____, 2. _____, 3. _____

X. Name two types of balance for a tire:

1. _____, 2. _____

XI. Crossword Puzzle: ELECTRICITY



ACROSS CLUES:

2. abbreviation for alternating current
4. a unit for measuring electrical current
5. a device used to change AC to DC
6. an electrical safety device
8. A generator that produces afternating current
10. ability of an electrical conductor to hold back the flow of current
11. a unit of measurement of electrical current flow

DOWN CLUES:

1. a unit of measurement of electrical pressure
3. the complete path of an electric current
7. a material that allows the flow of electrical current
9. a connection between an electric circuit and the ground

XII. ELECTRICITY - True/False: Write T by each correct statement and F by each false statement.

_____ 1. An ohm is a unit for measuring electrical resistance.

_____ 2. A volt is a measure of air pressure.

_____ 3. An alternator is a generator.

_____ 4. A condenser is an electrical device in the ignition system.

_____ 5. Insulation is material that conducts electricity.

_____ 6. A short circuit is a complete electrical path.

_____ 7. A relay is an electromagnetic switch to open or close a circuit.

_____ 8. Brushes are made of conducting material.

_____ 9. A battery is a group of electrical cells connected inside a case.

_____ 10. To charge a battery means to test and inspect the battery.

XIII. Word Search: CAR PARTS. Find the words listed below. Words may be up, down, backward, forward, or diagonal.

V F A N Y Y Y Z D N F G L I
C K N F B T P E X O H B U Y
A N E D L C B N P I F P W S
R G L N L Y S I M S M L J Q
B Q F K P N B G U S C L W R
U T B P J H G N P I Q B Y O
R M R C F Y G E L M D A E B
E B A M E L A S E S E T U M
T X K K G X C E U N M T Q T
O H E T L V G O F A F E H L
R O P E H Y W Y Y R P R H P
C R A D I A T O R T P Y Y C
O L A L T E R N A T O R Z D
C F C U N O T S I P E L K R

FIND THESE WORDS IN THE ABOVE PUZZLE :

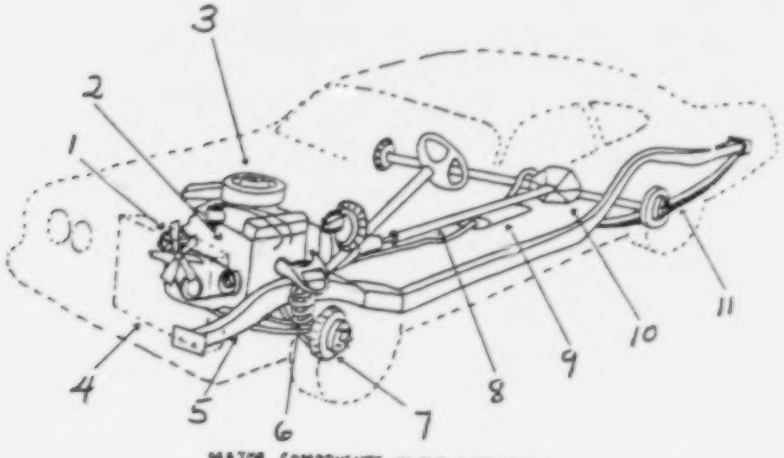
ALTERNATOR	AXLE	
BATTERY	BRAKE	
CARBURETOR	ENGINE	FAN
FUELPUMP	✓PISTON	
RADIATOR	TRANSMISSION	

XIV. SUSPENSION SYSTEM - Underline six words in the following list that relate to the suspension system of the automobile.

advance	caster
shock absorbers	speedometer
align	chassis
backfire	sludge
dynamic balance	camber

XV. MAJOR COMPONENTS OF THE AUTOMOBILE: It is important to associate the vocabulary terms with the actual auto parts. One way to practice is with pictures or photographs.

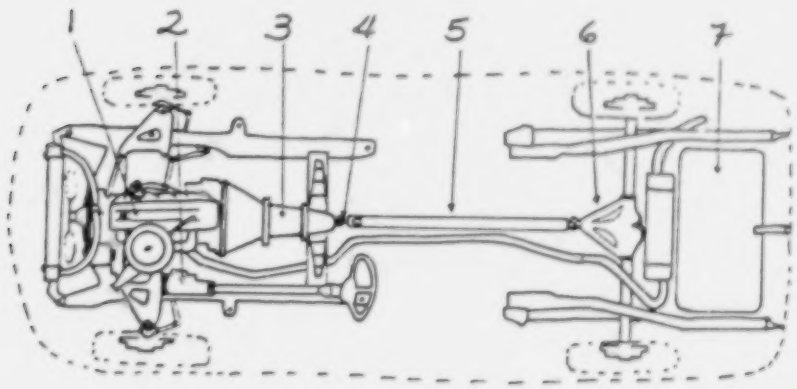
A) Look at the illustration below.
Write the names of the components that the numbers point to.
If you need help, look back at the illustration on page 7.



MAJOR COMPONENTS IN THE AUTOMOBILE

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

XV. B) - Look at the illustration below of the power train of the automobile. This is a view of the underside of a car.
- Write the names of the components the numbers point to.
- To check your answers, look at the illustration on page 7.



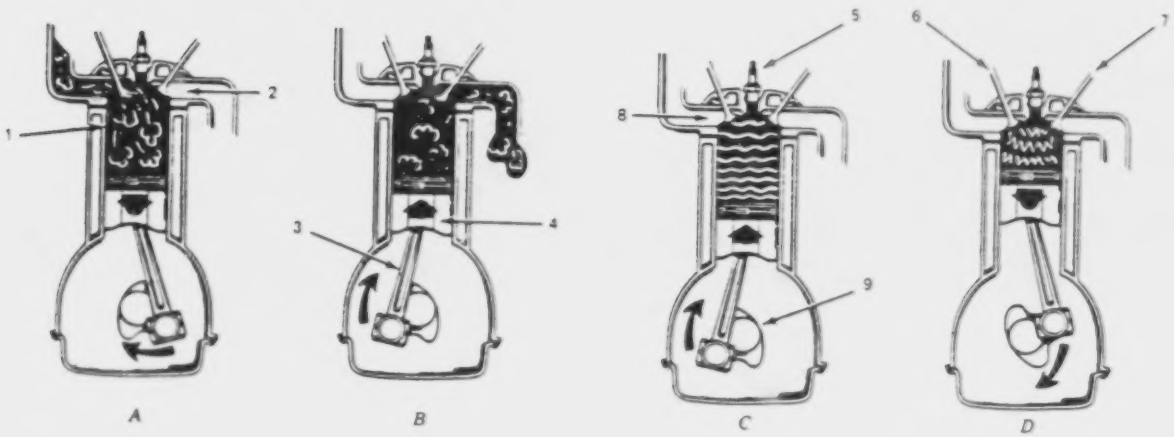
POWER TRAIN OF THE AUTOMOBILE

1. _____ 5. _____
2. _____ 6. _____
3. _____ 7. _____
4. _____

XVI. THE AUTOMOTIVE ENGINE:

- Study the illustration of engine strokes and parts on page 8.
- Compare the illustration on page 8 with the following illustration.
- Write the correct letter by the name of each engine stroke.
- Write the correct number by each part name.

Courtesy John Wiley, 1981



PERFORMANCE SITUATION

STROKES

_____Intake _____Compression _____Power _____Exl

PARTS

_____ Piston

_____Intake port

_____Exhaust port

_____Connecting rod

_____Cylinder

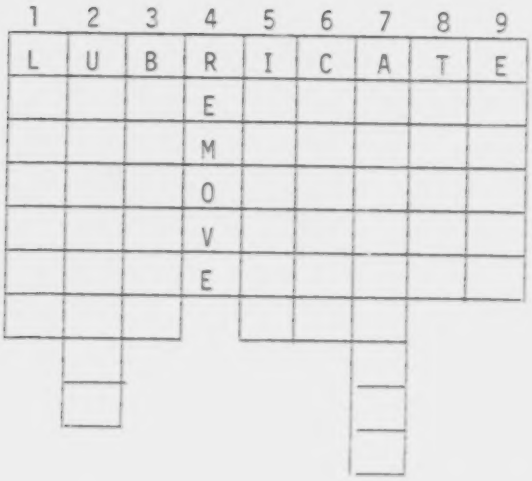
_____Exhaust valve

_____Intake valve

_____Spark plug

_____Crankshaft

XVII. Using the clues, write a word down from each number.



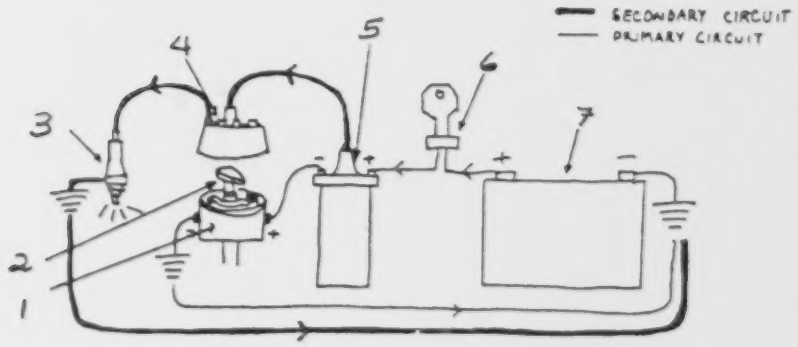
CLUES:

1. A system of movable rods and levers for connecting parts
2. A kind of joint
3. A part that reduces friction between two moving parts
4. To take out or away
5. To set up, ready for use
6. A mixture of water and antifreeze
7. A chemical added to water to lower the freezing point and raise the boiling point
8. Turning or twisting effort
9. The part of the car that produces power by burning fuel

XVIII. IGNITION SYSTEM:

Study the parts of the ignition system in the illustration on page 9.

Write the names of the components the numbers point to in the illustration below.



IGNITION SYSTEM

1. _____ 5. _____
2. _____ 6. _____
3. _____ 7. _____
4. _____

XIX. Write the names of the ignition system parts that are described below.

1. A device that provides a spark to ignite the fuel:

   _____

2. The component that provides electrical current to the cylinder:

   _____

3. A case containing a group of electrical cells:

   _____

4. The cover of the distributor:

   _____

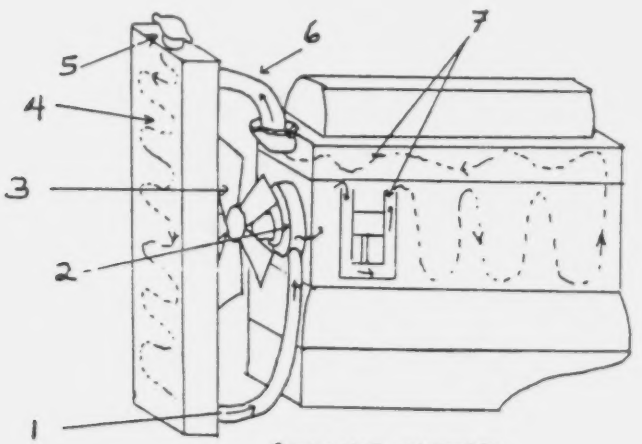
5. A part that revolves (goes around):

   _____

XX. COOLING SYSTEM:

A) Study the parts of the cooling system in the illustration on page 9.

Write the names of the components the numbers point to in the illustration below.



COOLING SYSTEM

1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____

B) Name four parts of the cooling system that water travels through:

1. _____ 3. _____

2. _____ 4. _____

C) Name the part that cools the water: _____

XXI. On the next page is a pre-delivery inspection checklist for new cars.

A) Make your own list of all the auto mechanics terms from the vocabulary cards that you can find on that page.

B) Make a list of ten words you do not know on the checklist.

C) Look up the new words in a textbook glossary or dictionary and write down the meanings. (You may also ask an auto mechanic the meaning of the words.)

D) Pronounce the new words on your list with a teacher or other person who speaks English well.

10 PITCH

12 PITCH

VEHICLE IDENTIFICATION NUMBER

PRE-DELIVERY INSPECTION CHECKLIST

MODEL	YEAR	COLOR	STOCK NUMBER	R O NUMBER
1545	1985	011	1185	

1 INITIAL OPERATIONS

- 1A Install fuse/turn on extended storage switch, set clock.
- 1B Install outside mirror.
- 1C Check spare tire mounting and adjust pressure
- 1D Adjust tire pressure.
- 1E Install jack, tools, and tire inflator.
- 1F Torque wheels and install wheel trim.
- 1G 280ZX: Remove front spring spacer and windshield caution label.

2 UNDERHOOD CHECKS: COLD ENGINE

- 2A Primary and secondary hood latch operation.
- 2B Steering box or power steering fluid level.
- 2C Brake and clutch master cylinder fluid level.
- 2D Engine oil level.
- 2E Radiator coolant level.
- 2F Battery, cables, electrolyte level/charge indicator.
- 2G Windshield washer fluid level.
- 2H Tension of all belts.
- 2I EFI equipped models: torque of all fuel line clamps.

3 STATIONARY EVALUATION

- 3A Door, trunk/tailgate/hatch, sunroof, windows, locks: operation/alignment.
- 3B General interior inspection.
- 3C Body and paint inspection.
- 3D Seat belt operation (all).
- 3E Headlight aim, high and low beams, quick flash switch and lane changer.
- 3F Parking, side clearance, license plate lights.
- 3G Hazard warning lights.
- 3H Tail, stop, and back-up lights.
- 3I Dash, dome, and courtesy lights.
- 3J Indicator warning lights and sound warning systems.

4 ROAD TEST

- 4A Instruments and gauges.
- 4B Service and parking brakes.
- 4C Standard transmission, transfer case and clutch.
- 4D Automatic transmission, shift patterns, kick-down, park position and inhibitor switch.
- 4E Steering for wheel alignment, return, tracking, pull and free play.
- 4F Engine performance during all driving conditions.
- 4G Air conditioning operation.
- 4H Heater and defroster operation.
- 4I Wheel balance.
- 4J Windshield wipers and washers.
- 4K Trim antenna/radio evaluation.
- 4L Horn.
- 4M Automatic speed control device operation.
- 4N Squeaks, rattles, and wind noise.
- 4O Glow plug system operation (diesel).
- 4P Visual check for excessive smoke (diesel).

5 UNDERHOOD CHECKS: ENGINE OPERATING AT NORMAL TEMPERATURE

- 5A Automatic transmission fluid level.
- 5B A/C sight glass, freon charge.
- 5C Fuel clamp and hose leaks.

6 UNDERBODY CHECKS

- 6A Transportation damage.
- 6B Loose fasteners: body, steering, suspension.
- 6C Exhaust clearances.
- 6D Fluid leaks.
- 6E Transmission/transfer case and differential fluid level.

FINAL INSPECTIONS

7 CLEAN, DETAIL & FINAL EXTERIOR INSPECTION

- 7A Water leaks.
- 7B Body and paint.
- 7C Fits and alignment.
- 7D Decals, moldings and labels.

8 SEAT PROTECTOR REMOVAL CLEAN, DETAIL & FINAL INTERIOR INSPECTION

- 8A Soiled surfaces.
- 8B Excess adhesive.
- 8C Tears/rips.
- 8D Fits and alignment.

FINAL INSPECTION APPROVAL SIGNATURE

DATE

S61-S6 82

BEST COPY AVAILABLE

I. motor, mount, muffler, overhaul, piston, pulley, radiator, reassemble, reciprocating, relay

III.

1. antifreeze
2. generate
3. eccentric
4. reassemble
5. flammable
6. rotor
7. commutator
8. repair
9. condenser
10. resistance
11. toxic
12. emissions

IV.

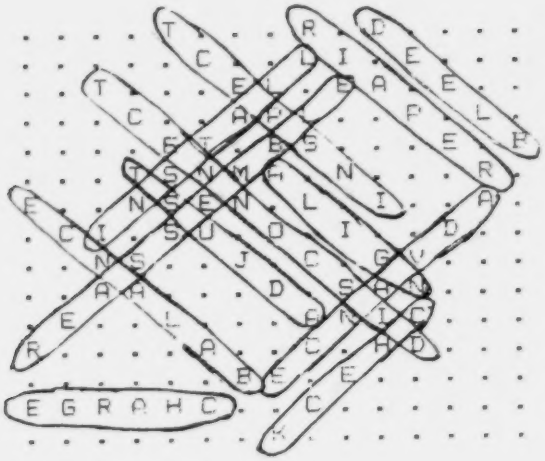
4	generate
1	adjust
9	hazardous
3	check
11	score
5	device
13	toxic
7	combustion
12	shield
2	align
6	defect
10	repair
8	distortion

V.

✓advance
✓diagnose
✓overhaul
✓generate
fuel pump
shim
generator
✓recondition
flywheel
✓lubricate
solenoid
clutch

VII. THE BUSY MECHANIC

HERE IS THE ANSWER KEY:

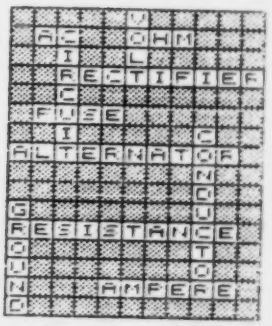


VIII.
1. tachometer
2. quick charger
3. ammeter
4. micrometer
5. voltmeter
6. dwellmeter
7. hydrometer
8. ohmmeter

IX. Any of the following: parallel, primary, open, series, short, secondary

X.
1. static
2. dynamic (spin)

XI. Crossword Puzzle: ELECTRICITY

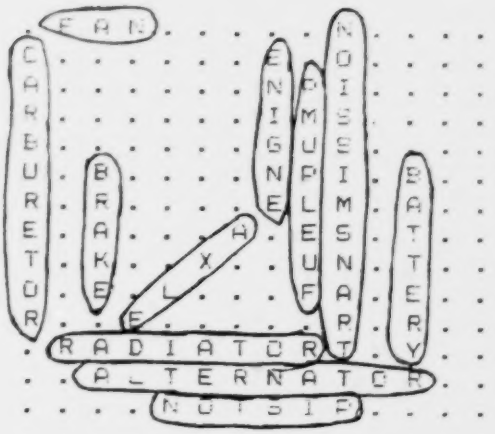


XII.

1.	T		6.	F	
2.	F		7.	T	
3.	T		8.	T	
4.	T		9.	T	
5.	F		10.	F	

XIII. CAR PARTS

HERE IS THE ANSWER KEY:



XIV.

advance	caster
shock absorbers	speedometer
align	chassis
backfire	sludge
dynamic balance	camber

XV. A)

1. alternator
2. engine
3. air cleaner
4. radiator
5. frame
6. shock absorber
7. brake
8. drive shaft
9. muffler
10. differential
11. spring

XV. B)

1. engine
2. steering gear
3. transmission
4. universal joint
5. drive shaft
6. differential
7. fuel tank

XVI. PERFORMANCE SITUATION

STROKES

A Intake C Compression D Power B Exhaust

PARTS

4 Piston	1 Cylinder
8 Intake port	7 Exhaust valve
2 Exhaust port	6 Intake valve
3 Connecting rod	5 Spark plug
	9 Crankshaft

XVII. 1. linkage
2. universal
3. bearing
4. remove
5. install
6. coolant
7. antifreeze
8. torque
9. engine

XVIII. 1. distributor
2. rotor
3. spark plug
4. distributor cap
5. ignition coil
6. ignition switch
7. battery

XIX. 1. spark plug
2. distributor
3. battery
4. distributor cap
5. rotor

XX. A)
1. hose
2. water pump
3. fan
4. radiator
5. radiator cap
6. hose
7. water jacket

B)
1. hoses
2. radiator
3. water pump
4. water jackets

C) fan

There are many safety hazards in the workplace of an auto mechanic. Workers use heavy tools and equipment that may be dangerous. They also work around powerful or flammable chemicals. It is very important for the auto mechanic to recognize all safety problems, and to learn to properly use all equipment and materials for his or her own safety and the safety of others.

I. Review the meaning of the following words and explain how they relate to safety in the workplace.

carbon monoxide	defect
emissions	flammable
fumes	ground
hazardous	leak
-proof	shield
toxic	ventilation

II. AUTOMOTIVE SHOP SAFETY RULES

1. Don't smoke near gasoline.
2. Put equipment away after use.
3. Make sure there is adequate (enough) ventilation for the job.
4. Wear protective clothing or equipment necessary (for example: gloves, goggles, shoes with good tread) for the job.
5. Have fire extinguishers and know how to use them.
6. Store flammable liquids and oily rags in safety containers.
7. Wipe up spills immediately.
8. Learn how to operate equipment safely.
9. Lift with the legs, not the back
10. Ground all electrical tools and portable lights
11. Do not use defective equipment or tools.
12. Be careful around moving parts (flywheels, fan belts, gears, and pulleys).

III. Mark each safe action S, and each unsafe condition or action U. EXAMPLE:

__U__ Bob smokes while he works in the auto shop.

_____ 1. Joe wears goggles when he paints.

_____ 2. Mr. Arnold cleaned his hands with gasoline.

_____ 3. Someone left tools out on top of a car.

_____ 4. Susan waited until the engine cooled off before she worked on it.

_____ 5. There is oil leaking onto the floor.

_____ 6. Battery acid spilled on his leg.

_____ 7. Mr. Perez washed off the gasoline immediately.

_____ 8. Carmen called the repairman to fix the hydraulic lift.

IV. HAZARDS: There are four general types of hazards (dangers) in the workplace of an auto mechanic.

1. OBJECTS that can hit, burn, or hurt persons;
2. SLIPS, TRIPS, and FALLS;
3. MUSCLE STRAINS from lifting, pushing, or pulling;
4. ENVIRONMENT - toxic fumes, heat, etc.

V. Exercise: Write the kind of hazard in each of the following situations. Write the number of the safety rule for each situation.

	HAZARD	SITUATION	RULE
EX:	slips, trips, & falls	An oil spill on the floor	7
	_____	1. A big stack of batteries in the middle of the room	____
	_____	2. Small fire starts in an engine	____
	_____	3. A car jacked up incorrectly	____
	_____	4. Customers smoking in the shop	____
	_____	5. A leaky battery	____
	_____	6. A hoist that is not working properly	____
	_____	7. Lifting with the back	____
	_____	8. An electrical tool not unplugged after use	____
	_____	9. A loose fan belt in a car with the engine running	____
	_____	10. Oily and dirty rags all over the shop	____

III.

1.	S	5.	U
2.	U	6.	U
3.	U	7.	S
4.	S	8.	S

V.

	HAZARD	RULE
1.	objects	2
2.	environment	5
3.	objects	8
4.	environment	1
5.	objects	4
6.	objects	11
7.	muscle strains	9
8.	objects	8 or 2
9.	objects	12
10.	environment	6

The Employability Skills Charts on the following four pages give information on different jobs in the auto mechanics field. The mechanic's helper is the entry-level job. As additional skills and training are acquired, the helper can become a specialist in one or more areas (brakes, engine overhaul, tune up, etc.)

I. -Read the Mechanic's Helper chart.
-Write jobs a mechanic's helper does, starting with the word given.

EXAMPLE:

Completes: service records

1. Maintains: _____
2. Performs: _____
3. Repairs: _____
4. Uses: _____
5. Finds: _____
6. Replaces: _____

II. Make a list of other jobs a mechanic's helper may do, using the auto mechanics terms given.

1. Align: _____
2. Balance: _____
3. Advance: _____
4. Install: _____
5. Check: _____
6. Charge: _____

Mechanic's Helper

Related Basic Skills

MATHEMATICS

- Interprets manuals, charts, graphs, and schematics.

SCIENCE

- Identifies oxidation as the cause of rust.
- Demonstrates knowledge of chemical reactions when handling battery acid, hazardous chemicals, and other corrosive agents.
- Demonstrates fire prevention skills.
- Demonstrates an understanding of direct current electrical systems.
- Identifies the effects of expansion and contraction in metal and fluids.

COMMUNICATIVE ARTS

- Uses the appropriate vocabulary of the automobile industry.

Job Skills

- Finds the causes of vehicle failures and makes routine inspections.
- Performs regular scheduled work and completes service records.
- Under supervision performs engine overhaul procedures.
- Maintains and repairs the drive train.
- Tests and replaces faulty electrical system parts.
- Maintains, repairs, or replaces cooling system parts.
- Performs routine repairs and replacement of parts in the steering, brake, and suspension system.
- Checks vehicle air conditioning for leaks, replaces worn parts, and charges system.
- Repairs or replaces faulty heaters and control switches, levers, and cables.
- Uses test equipment.

Responsibility Skills

- Works without close supervision; takes initiative.
- Works within the organizational structure.
- Works well with fellow employees.
- Respects authority and carries out assignments willingly.
- Accepts responsibility for own actions.
- Uses good time management skills.
- Presents an appropriate personal appearance.
- Demonstrates flexibility in work.
- Respects the property of others.
- Exhibits positive health and safety habits in working with people, equipment, and lifting objects.
- Keeps up-to-date with new information related to the job.
- Exhibits cleanliness of tools and work space.
- Possesses valid driver's license and demonstrates acceptable driving skills.

Arizona Department of Education, 1984

Automotive Mechanic Specialists

Automotive Mechanic Specialists have mastered the detailer and mechanic's helper's skills, in addition to those of a specialist.

Related Basic Skills

MATHEMATICS

- Calculates tolerances and ratios using various measurement systems.

SCIENCE

- Demonstrates an understanding of the principles of hydraulics (works by fluid), electronics, and pneumatics (works by air) as appropriate for specialty.
- Demonstrates an understanding of the physical effects of stress, clearance, and tolerance.
- Demonstrates an understanding of the properties of certain gases and chemicals.

COMMUNICATIVE ARTS

- Reads charts, manuals, schematics, tables, and graphs.
- Interprets the results of electronic sensors and computerized controls.

Job Skills

Brake Specialist

- Inspects and turns brake drums.
- Inspects and turns rotors.
- Replaces brake pads.
- Repairs or replaces brake cylinders.
- Repairs brake hoses.
- Replaces brake shoes.
- Bleeds brake system.
- Adjusts brakes.

Front End Alignment Specialist

- Inspects and replaces front wheel bearings.
- Inspects and repairs front suspension system.
- Inspects steering.
- Inspects and replaces steering damper.
- Replaces shock absorbers and mountings.
- Adjusts or replaces torsion and trunnion bars.
- Balances wheels and tires.
- Repairs or replaces power steering pump.
- Replaces pivot points on steering linkage.
- Rebuilds power steering cylinder.
- Lubricates ball joints.

Responsibility Skills

- Works as a member of a team to solve problems.
- Respects the opinions of other people on the team.
- Utilizes team members as resource persons.
- Takes pride in workmanship and development of safe working habits.
- Complies with shop standards, company policy, and government regulations.
- Maintains the flexibility and knowledge necessary to switch from one job task to another.
- Deals effectively and appropriately with frustration, stress, and tension.
- Accepts responsibility for own actions.
- Establishes short-term and long-term goals.
- Communicates effectively and appropriately with supervisor or the person who maintains contact with the customer.

Arizona Department of Education, 1984

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- Demonstrates an understanding of the properties of certain gases and chemicals.

COMMUNICATIVE ARTS

- Reads charts, manuals, schematics, tables, and graphs.
- Interprets the results of electronic sensors and computerized controls.

Job Skills

Climate Control Specialist

- Inspects and repairs or replaces air conditioning systems.
- Inspects and repairs or replaces heating system.
- Diagnoses electronic computer problems in climate control system.
- Checks system for leaks and adds freon.
- Replaces compressor in air conditioning system.
- Replaces electronic resistors in climate control system.

Engine Overhaul Specialist

- Inspects and diagnoses engine problems.
- Grinds valves.
- Installs new rings.
- Installs oil pumps.
- Replaces timing gears and chain.
- Rebuilds manual transmission.
- Repairs or replaces differentials.
- Replaces pilot bearings.
- Repairs or replaces engines.
- Replaces engine mounts.
- Replaces radiators.
- Inspects and flushes cooling system.
- Analyzes and repairs cooling system problems.

Responsibility Skills

- Works as a member of a team to solve problems.
- Respects the opinions of other people on the team.
- Utilizes team members as resource persons.
- Takes pride in workmanship and development of safe working habits.
- Complies with shop standards, company policy, and government regulations.
- Maintains the flexibility and knowledge necessary to switch from one job task to another.
- Deals effectively and appropriately with frustration, stress, and tension.
- Accepts responsibility for own actions.
- Establishes short-term and long-term goals.
- Communicates effectively and appropriately with supervisor or the person who maintains contact with the customer.
- Demonstrates good industrial safety habits.

Arizona Department of Education, 1984

I.
1. Maintains: cooling system parts, drive train, etc.
2. Performs: engine overhaul, regular work, etc.
3. Repairs: drive train, cooling system parts, etc.
4. Uses: test equipment
5. Finds: causes of vehicle failures
6. Replaces: heaters, switches, electrical parts, etc.

II.
1. Align: front end
2. Balance: wheels
3. Advance: spark, ignition
4. Install: batteries, parts, etc.
5. Check: oil, gauges, coolant level, etc.
6. Charge: battery

APPENDIX A

VESL VOCABULARY LIST: AUTO MECHANICS

A
AC
ACCELERATOR PUMP
ADJUST
ADVANCE
AIR CLEANER
ALIGN
ALTERNATOR
AMMETER
AMPERE
ANTIFREEZE
AXLE

B
BACKFIRE
BALANCE
BATTERY
BEARING
BLEED
BORE
BRUSH
BUSHING

C
CAM
CAMBER
CARBON MONOXIDE
CARBURETOR
CASTER
CATALYTIC CONVERTER
CHARGE
CHASSIS
CHECK
CIRCUIT
CLUTCH
COMBUSTION
COMMUTATOR
COMPONENT
COMPRESSION
CONDENSER
CONDUCTOR
CONNECTING ROD
COOLANT
CRANKSHAFT
CYLINDER
CYLINDER BLOCK

D
DEFECT
DEVICE
DIAGNOSE
DIFFERENTIAL
DISASSEMBLE
DISC BRAKE
DISCONNECT
DISTORTION
DISTRIBUTOR
DRIVE SHAFT
DWELL METER

E
ECCENTRIC
EMISSIONS
ENGINE
EXHAUST MANIFOLD

F
FAN
FAN BELT
FILTER
FIRING ORDER
FLAMMABLE
FLOAT
FLYWHEEL
FUEL PUMP
FUMES
FUSE

G
GAP
GASKET
GAUGE
GENERATE
GENERATOR
GROUND

H
HAZARDOUS
HEATER
HONE

HOUSING
HYDRAULIC
HYDROMETER

I
I.D.
IDLE SPEED
IGNITION
INSPECT
INSTALL
INSULATION
INTAKE MANIFOLD

L
LEAK
LINKAGE
LUBRICATE

M
MECHANIC
MICROMETER
MOTOR
MOUNT
MUFFLER

O
OHM
OHMMETER
OVERHAUL

P
PISTON
POWER STEERING
-PROOF
PULLEY

Q
QUICK CHARGER

R
RACK & PINION STEERING GEAR
RADIATOR
REASSEMBLE
RECIPROCATING
RECIRCULATING BALL & NUT STEERING GEAR
RECONDITION
RECTIFIER
RELAY
REMOVE
REPAIR
RESISTANCE
ROTOR

S
SCORE
SERVICE
SHIELD
SHIM
SHOCK ABSORBERS
SHORT CIRCUIT
SLUDGE
SOLENOID
SOLVENT
SPARK PLUG
SPECIFIC GRAVITY
SPECIFIED
SPEEDOMETER
STEERING GEAR
SUSPENSION

T
TACHOMETER
TAPER
THROTTLE
TIMING
TORQUE
TOXIC
TRANSMISSION

U
UNIVERSAL JOINT

V
VACUUM
VALVE
VEHICLE
VENTILATION
VISCOSITY
VOLT
VOLTMETER

W
WATER JACKETS

APPENDIX B

VOCABULARY EXERCISES: A RESOURCE LIST

I. LISTENING AND SPEAKING

1. Listen to the terms and definitions on tape or pronounced by the teacher.
2. Pronounce terms (modeled on tape or by teacher).
3. Listen to a tape of two or three sentences and discriminate between sounds (e.g. Tape the exercise; Type the exercise).
4. Mini-dialogs: Student matches an appropriate response to a situation described in one sentence. The response may be advice, so student gets practice with command forms.
5. Give orally as many forms of a word as appropriate (add, addition, additional).
6. Give an original definition of a term.
7. Answer questions that require using new vocabulary in the answers.
8. Answer true or false to statements read orally.
9. Picture stimulus: identify illustrations of equipment, materials, workers, actions, etc.
10. Use audio flashcards: hear - see - say the terms.
11. Translate terms orally to native language.
12. Name all words in a particular category (optional: doing it within a time period).
13. True-false with picture stimulus: teacher makes a statement about the picture, student answers true or false.
14. Complete a dialog with given vocabulary terms.
15. Use terms in original sentences (spoken to teacher, classmates, or friend).

II. READING AND WRITING

1. Label pictures of objects or of work situations.
2. Replace a synonym with a new vocabulary term.
3. Give multiple choice exercises with definitions for a vocabulary term in English or students' native language.
4. Scramble sentences containing vocabulary terms. The student puts the sentences in order. Parts may be labelled a, b, c, d, etc. for easy answering.
5. Answer in writing questions that require vocabulary terms in the answers.
6. Alphabetize selected terms.
7. Do fill-in-the-blank exercises. Variations: a) give the first letter of the word needed; b) fill in all verbs, or nouns, or vowels; c) give Cloze exercises.
8. True/false exercises: answer with T/F, or rewrite with a corrected statement.
9. Give a vocabulary term followed by its definition in scrambled word order (e.g. typewriter; that/machine/a/types). Put the definition in order.
10. Match written definitions to terms.
11. Complete a story with given vocabulary terms.
12. Write different forms of vocabulary terms, using verbs, nouns, adjectives, or adverbs (e.g. align, alignment)
13. Write an original definition for a term.
14. Write words or sentences using vocabulary terms from dictation or tape.
15. Use terms in original sentences (written).

II. READING AND WRITING (continued)

16. Make sketches or diagrams of terms where appropriate.
17. Label illustrations or objects pertaining to the occupation studied (tools, equipment, etc.)
18. Bingo game (See Troth, I Know - A Vocabulary Game for the Food Trades): students cover terms on cards when cued by an oral definition.
19. Identify or select information requested from filled-out work documents.
20. Put steps for a vocational process in order, by writing or using flashcards.

Activities for VESL Vocabulary Cards. Gail F. Shay. Arizona Department of Education, Phoenix, AZ. May 1983.

A handbook with activities in the areas of typing, accounting, human relations in business, and business machines. Includes vocabulary exercise resource list.

Auto Mechanics Competency Profile. Oklahoma State Department of Vocational and Technical Education.

Folder format printed with student record information on outside, and checklist for competencies inside. Additional sheet included for rating interpersonal competencies.

Automotive Mechanics. Multi-cultural Competency-based Vocational Curricula. Illinois State Board of Education. Career Development Center, Southern Illinois University. Carbondale, IL. 1981.

Detailed duty-task index for mechanic's helper and service mechanic, including performance objectives and guides. Technical terms defined and tools listed, given in Spanish and Laotian.

Automotive Mechanics. 8th Edition. Wm H. Crouse. McGraw-Hill, Gregg Division, New York, NY. 1980.

Complete vocational textbook with glossary

Basics. John Remling. John Wiley & Sons, New York, NY. 1981.

Large paperback format. The basic manual (or manual of basics) in a series of auto specialty texts.

Functional Notional Concepts: Adapting the Foreign Language Textbook. Gail Gunterman and June Phillips. Center for Applied Linguistics, Washington, DC. 1982.

A practical book for implementing the functional approach to language learning.

Glossary of Key Words: Auto Mechanics. Vocational Reading Power E.S.E.A. Title III. The Exchange, University of Minnesota, Minneapolis, MN. June 1975.

One of a good series. Words divided into syllables. Easy, general definition plus more specific and difficult definition. Example sentences.

Handbook for the VESL Teacher. Linda Mrowicki and Patricia Dehesus. Arlington Heights, IL. Illinois Adult Indochinese Refugee Consortium. March 1981.

Excellent handbook on creating VESL lessons, with many suggested resources and activities

It's Too Damn Tight. John F. Fanselow. TESOL Quarterly, Voc. 14, No. 2, pp. 141-155. June 1980.

Article on making vocabulary learning more relevant for the ESL student

Linking Basic Skills to Entry-level Auto Mechanic & Auto Body Worker Tasks. Salt Lake Skills Center. Utah Technical College, Salt Lake City, UT. c. 1983.

Excellent reference: a project that identified entry-level tasks, basic skills related to occupational tasks, instructional resources available, and assessments related to basic skills. (Also good project methodology)

Occupational Information System of Arizona User's Manual. Arizona State Occupational Information Coordinating Committee, Phoenix, AZ. 1981.

Occupational information

Safety in the Auto Shop. Safety Education Data Sheet No. 57. National Safety Council. Chicago, IL. March 6, 1975.

Pamphlet of safety guidelines and recommendations

Auto Repair for Dummies. Deanna Sclar. McGraw-Hill Book Co., New York, NY. 1976.

Recommended resource for beginners

Automotive Electrical Systems, Classroom Manual. Chek-Chart. Ken Layne, Editor. Harper & Row, New York, NY. 1978.

Illustrated textbook with key words, review questions and summaries, sample tests, etc.

Automotive Technology. Developmental Materials for Non-Native Students. Illinois State Board of Education. Elgin Community College, Elgin, IL. 1981.

Materials to be used in conjunction with the textbook BASICS by J. Remling. Contains readings and exercises on vocabulary and comprehension.

ISSOE: Auto Mechanics. Office of Occupational Education. New York State Education Department, Albany, NY. June 1977.

Large handbook organized by unit, module, task, major objectives, enabling objectives, and criterion-referenced measurement sheets.

Learning to READ and WRITE the Automotive Way.
Learning to VERBALLY & VISUALLY COMMUNICATE the Automotive Way.
Learning to DO MATH the Automotive Way.
The Educationally Disadvantaged Committee Industrial Education Inservice Project. California State Department of Education and California State University, Los Angeles, CA. VOICE (Vocational Occupational Information Center for Educators), Sacramento, CA. Field Test copies -- no date.

Excellent series. Includes basic skills checklist for students, instructional techniques and concepts for teachers, and student instructions, assisgnments, plus additional activities.

New Perspectives, VESL: An Annotated Bibliography. Gustavo Valadez. San Jose, CA. 1983.

Includes a description of twelve VESL resources in auto mechanics

Program Task List: Automotive Mechanics. Department of Public Instruction, Instructional Services Branch, Vocational Education Division. Obtained through ECN/IVCC, Sangamon State University, Springfield, IL.

Eleven-page list of occupational tasks for auto mechanics

COMPUTER SOFTWARE

Crossword Magic. Larry Sherman. L & S Computerware, 1008 Steward Drive, Sunnyvale, CA 94086.

Computer program that makes crossword puzzles very rapidly

Wordmaze Maker. Freeloader 500. American Software Publishing Co., Washington, DC 20036.

Part of a large series of public domain software, some good and some needing work. "Wordmaze Maker" generates word search puzzles, but has some problems in printing.

ADDITIONAL ACTIVITIES: AUTO MECHANICS

1. Write a short story using at least ten of the auto mechanics terms.

2. Collect any papers, manuals, or receipts from car repairs, new cars or parts. Find the auto mechanic terms used on the papers.

3. Describe problems you had with your car to other students. Listen to the problems other students had with their cars.

4. Point to and identify as many parts of a real car as you can.

5. Put the names of car parts in an envelope. Each student must pick a part name (or names) and point out the part on a real car.

6. Collect pictures of the same or similar auto parts (for example: tires or batteries). Compare the parts: size, shape, type, color, design, price, etc.

7. Guessing game: Students divide into teams. Team members each describe a car part without saying its name. The other team tries to guess the name of the part.

8. Give commands to another student to perform using the following words: adjust, align, disassemble, disconnect, inspect, reassemble, balance. (Example: Align the pencil with the book.)

9. Make a picture bingo game. Use pictures for the cues. Students find the word on the bingo card.

10. List all your auto mechanic skills and work experience. Also write down your career goals in auto mechanics. Use this to practice for a job interview with an auto mechanic.

NOTE: Answers for the additional activities will not be provided.

FLASH CARDS

To obtain the maximum benefit from the enclosed flash cards, the following is recommended:

1. Laminate the flash card sheets.
2. Cut each laminated sheet into five cards.
3. Arrange the cards alphabetically, inserting the picture cards at the appropriate places.
4. Hole-punch the upper left corner of each card.
5. Connect the cards together with a hinged ring.

A C

A C

ABBREVIATION FOR "ALTERNATING CURRENT". AN ELECTRIC CURRENT OR FORCE WHICH FIRST FLOWS ONE WAY IN A CIRCUIT, THEN THE OTHER WAY. IT CHANGES OR ALTERNATES 60 TIMES A SECOND.

ALL ELECTRICITY IN CARS MUST BE DIRECT CURRENT (DC). THE CURRENT IN HOMES IS AC.

ACCELERATOR PUMP

AC-CEL-ER-A-TOR PUMP

A PUMP IN THE CARBURETOR THAT ADDS EXTRA FUEL WHEN THE ACCELERATOR PEDAL IS PUSHED DOWN

THE ACCELERATOR PUMP IS LINKED TO THE CARBURETOR.
THE ACCELERATOR PUMP MAKES THE AIR/FUEL MIXTURE RICHER.

ADJUST

AD-JUST

TO CHANGE A LITTLE BIT; TO MAKE SOMETHING RIGHT

MR. VALDEZ ADJUSTED THE CARBURETOR.

ADVANCE

AD-VANCE

TO CHANGE OR SET THE IGNITION TIMING SO THAT THE SPARK OCCURS EARLIER

THE MECHANIC NEEDS TO ADVANCE THE SPARK.

AIR CLEANER

AIR CLEAN-ER

A DEVICE THAT REMOVES DIRT AND DUST FROM THE AIR

PLEASE REPLACE THE AIR CLEANER ON MY CAR.

ALIGN

A-LIGN

TO BRING INTO POSITION

LEE'S JOB IS TO ALIGN THE FRONT END OF CARS AND TRUCKS.

ALTERNATOR

AL-TER-NA-TOR

A GENERATOR THAT PRODUCES ALTERNATING CURRENT FOR CHARGING THE BATTERY AND OPERATING ELECTRICAL COMPONENTS

THE ALTERNATOR CHANGES MECHANICAL ENERGY INTO ELECTRICAL ENERGY.

AMMETER

AM-ME-TER

AN INSTRUMENT THAT MEASURES THE AMOUNT OF CURRENT FLOW IN AMPERES

TIM MEASURED THE AMOUNT OF CURRENT FLOW WITH THE AMMETER.

AMPERE

AM-PERE

A UNIT OF MEASUREMENT OF ELECTRICAL CURRENT FLOW

ONE VOLT OF PRESSURE MAKES ONE AMPERE FLOW THROUGH A RESISTANCE OF ONE OHM.

ANTIFREEZE

AN-TI-FREEZE

A CHEMICAL ADDED TO WATER TO LOWER ITS FREEZING POINT AND RAISE ITS BOILING POINT

SUE ADDED A GALLON OF ANTIFREEZE TO THE WATER IN THE RADIATOR.

AXLE

AX-LE

A BAR WITH A WHEEL ON EITHER END, AROUND WHICH THE WHEELS TURN OR WHICH TURNS WITH THE WHEELS

THE REAR <u>AXLE</u> TRANSMITS THE DRIVING FORCE FROM THE DIFFERENTIAL TO A REAR WHEEL.

BACKFIRE

BACK-FIRE

BURNING OF FUEL OUTSIDE THE COMBUSTION CHAMBER

A <u>BACKFIRE</u> MAKES A LOUD POPPING NOISE.

BALANCE

BAL-ANCE

TO MAKE ALL PARTS OR AREAS OF EQUAL WEIGHT; EVEN DISTRIBUTION OF THE WEIGHT OF THE WHEEL AND TIRE ASSEMBLY

IT IS IMPORTANT TO <u>BALANCE</u> NEW TIRES AFTER YOU PUT THEM ON THE CAR.

2 TYPES OF BALANCING

1. SPIN BALANCE OR DYNAMIC BALANCE - BALANCE IN MOTION. THE BALANCE OF A WHEEL WHEN IT IS ROTATING. IT IS CORRECTED WITH WEIGHTS.
2. STATIC BALANCE - BALANCE AT REST. WEIGHT IS DISTRIBUTED AROUND THE AREA OF ROTATION. THE WHEEL WILL NOT MOVE BY ITSELF, NO MATTER WHAT POSITION IT IS IN. A BUBBLE BALANCE OR WHEEL WEIGHTS ARE USED FOR STATIC BALANCING.

BATTERY

BAT-TER-Y

A GROUP OF ELECTRICAL CELLS CONNECTED TOGETHER IN A CASE; IT STORES ELECTRICAL ENERGY IN CHEMICAL FORM.

A CHARGING <u>BATTERY</u> CHANGES ELECTRICAL ENERGY TO CHEMICAL ENERGY. A DISCHARGING <u>BATTERY</u> CHANGES CHEMICAL ENERGY TO ELECTRICAL ENERGY.

BEARING

BEAR-ING

A PART THAT REDUCES FRICTION BETWEEN TWO MOVING PARTS

ONE KIND OF BEARING IS THE BALL BEARING. IT HAS STEEL BALLS THAT ROLL BETWEEN THE INSIDE AND OUTSIDE PARTS.

BLEED

BLEED

TO REMOVE AIR FROM A HYDRAULIC SYSTEM

THE AUTO MECHANIC STUDENTS LEARNED HOW TO BLEED THE BRAKE SYSTEM.

BORE

BORE

THE DIAMETER (DISTANCE ACROSS) OF A CYLINDER

THE BORE OF A CYLINDER MAY BE TWO INCHES IN DIAMETER.

BRUSH

BRUSH

A BLOCK OF CONDUCTING MATERIAL THAT PICKS UP ELECTRIC CURRENT FROM A SLIP RING OR COMMUTATOR

BRUSHES TOUCH THE SLIP RINGS IN AN ALTERNATOR.

BUSHING

BUSH-ING

A METAL LINING BETWEEN TWO PARTS THAT GUARDS AGAINST FRICTION OR CORROSION

DO YOU NEED TO REPLACE THE BUSHING?

CAM

CAM

A DEVICE WHICH CHANGES ROTARY (ROUND TURNING) MOTION TO STRAIGHT LINE MOTION

CAMS ARE USED TO OPERATE VALVES AND PUMPS.

CAMBER

CAM-BER

THE INWARD OR OUTWARD TILT OF A WHEEL AT THE TOP (THE ANGLE FORMED BY THE CENTERLINE OF THE WHEEL AND THE TRUE VERTICAL)

THE TOP OF THE TIRE TILTED OUT IS POSITIVE CAMBER.

CARBON MONOXIDE (CO)

CAR-BON MON-OX-IDE

A POISONOUS GAS CAUSED BY INCOMPLETE BURNING OF FUEL

CARBON MONOXIDE IS IN THE ENGINE EXHAUST. IT HAS NO TASTE, COLOR, OR ODOR.

CARBURETOR

CAR-BU-RET-OR

THE PART OF THE FUEL SYSTEM THAT MEASURES AND MIXES FUEL AND AIR

THE CARBURETOR BREAKS UP THE GASOLINE INTO A FINE MIST.

CASTER

CAST-ER

THE FORWARD OR BACKWARD TILT OF THE STEERING AXIS

BACKWARD TILT (FROM THE VERTICAL) IS CALLED POSITIVE CASTER. IT HELPS TO KEEP THE WHEELS POINTED STRAIGHT AHEAD.

CATALYTIC CONVERTER

CAT-A-LYT-IC CON-VERT-ER

A PART OF THE EXHAUST SYSTEM THAT CHANGES HARMFUL GASES INTO HARMLESS GASES

CATALYTIC CONVERTERS REDUCE AIR POLLUTION FROM CAR EXHAUST.

CHARGE

CHARGE

TO CAUSE TO TAKE IN THE CORRECT AMOUNT OF ELECTRICITY IN A BATTERY

PLEASE CHARGE THE BATTERY FOR ME.

CHASSIS

CHAS-SIS

THE FRAME AND PARTS OF THE CAR WITHOUT THE BODY

THE BODY OF HIS CAR WAS DAMAGED IN THE ACCIDENT, BUT THE CHASSIS WAS O.K.

CHECK

CHECK

TO TEST OR EXAMINE SOMETHING TO SEE IF IT IS CORRECT

MR. WINTERS CHECKED THE WATER AND THE OIL.

CIRCUIT

CIR-CUIT

THE COMPLETE PATH OF AN ELECTRIC CURRENT

MANY CIRCUITS CONNECT THE PARTS OF THE CHARGING SYSTEM.

4 TYPES OF CIRCUITS

1. PARALLEL CIRCUIT - A SEPARATE PATH FOR CURRENT FLOW TO AND FROM TWO OR MORE LOADS.
2. PRIMARY CIRCUIT - THE CIRCUIT IN THE IGNITION SYSTEM THAT CREATES THE MAGNETIC FIELD IN THE COIL.
3. OPEN CIRCUIT - A CIRCUIT WITH A BREAK THAT PREVENTS THE FLOW OF CURRENT.
4. SERIES CIRCUIT - ONE PATH FOR THE FLOW OF CURRENT THROUGH TWO OR MORE LOADS.

CLUTCH

CLUTCH

A DEVICE USED TO CONNECT AND DISCONNECT THE ENGINE AND THE TRANSMISSION

YOU USE THE <u>CLUTCH</u> WHEN YOU SHIFT FROM ONE GEAR TO ANOTHER.

COMBUSTION

COM-BUS-TION

RAPID BURNING

<u>COMBUSTION</u> TAKES PLACE IN THE COMBUSTION CHAMBER ABOVE THE TOP OF THE PISTON.

COMMUTATOR

COM-MU-TA-TOR

COPPER BARS ATTACHED TO WINDINGS THAT CONDUCT ELECTRICITY

THE <u>COMMUTATOR</u> IS LOCATED BETWEEN AN ARMATURE AND A SET OF BRUSHES.

COMPONENT

COM-PO-NENT

SEVERAL PARTS PUT TOGETHER TO SERVE ONE PURPOSE

THE STEERING <u>COMPONENT</u> IS DAMAGED.

COMPRESSION

COM-PRES-SION

APPLYING PRESSURE TO A GAS TO REDUCE VOLUME

COMPRESSION TAKES PLACE IN THE COMBUSTION CHAMBER.

CONDENSER

CON-DENS-ER

AN ELECTRICAL DEVICE THAT CAN ABSORB AND STORE SURGES OF ELECTRICAL CURRENT; ALSO CALLED "CAPACITOR"

THE CONDENSER IS A PART OF THE IGNITION SYSTEM.

CONDUCTOR

CON-DUC-TOR

A MATERIAL THAT ALLOWS THE FLOW OF ELECTRICAL CURRENT

COPPER IS AN EXCELLENT CONDUCTOR.

CONNECTING ROD

CON-NEC-TING ROD

THE PART THAT LINKS A PISTON AND THE CRANKSHAFT; CHANGES ROTARY MOTION TO BACK AND FORTH MOTION (RECIPROCATING)

A CONNECTING ROD MUST BE VERY STRONG, BUT LIGHT IN WEIGHT.

COOLANT

COOL-ANT

THE MIXTURE OF WATER AND ANTIFREEZE USED IN A COOLING SYSTEM

COOLANT USUALLY HAS 50% ANTIFREEZE AND 50% WATER. COOLANT KEEPS THE ENGINE FROM OVERHEATING.

CRANKSHAFT

CRANK-SHAFT

A PART OF THE ENGINE THAT, ALONG WITH THE CONNECTING RODS, CHANGES THE UP AND DOWN MOTION OF THE PISTONS TO CIRCULAR (ROTARY) MOTION

THE CRANKSHAFT IS LOCATED IN THE CRANKCASE.

CYLINDER

CYL-IN-DER

A HOLE IN WHICH A PISTON MOVES

MODERN AUTOMOBILE ENGINES HAVE FOUR TO EIGHT CYLINDERS.

CYLINDER BLOCK

CYL-IN-DER BLOCK

THE PART OF THE ENGINE THAT HAS THE CYLINDERS

THE BLOCK MAY BE CALLED THE CYLINDER BLOCK OR THE ENGINE BLOCK.

DEFECT

DE-FECT

SOMETHING MISSING OR NOT PERFECT; A FAULT

DID YOU FIND ANY DEFECTS IN THE TIRES?

DEVICE

DE-VICE

A MECHANICAL PART FOR SOME SPECIFIC PURPOSE

A FUSE IS A SAFETY DEVICE.

DIAGNOSE

DI-AG-NOSE

TO INSPECT OR TEST TO DISCOVER ANY PROBLEMS

CARLOS DIAGNOSED THE REASON FOR THE OIL LEAK.

DIFFERENTIAL

DIF-FER-EN-TIAL

A GEAR DEVICE THAT LETS ONE WHEEL TURN AT A DIFFERENT SPEED FROM THE OTHER ON THE SAME AXLE DURING TURNS

THE DIFFERENTIAL RECEIVES POWER FROM THE PROPELLER SHAFT.

DISASSEMBLE

DIS-AS-SEM-BLE

TO TAKE APART IN AN ORDERLY WAY

THERESA DISASSEMBLED THE CARBURETOR.

DISC BRAKE

DISC BRAKE

A BRAKE SYSTEM THAT SLOWS OR STOPS THE VEHICLE WITH BRAKE PADS THAT CLAMP A DISC OR ROTOR

DO YOU HAVE DISC BRAKES OR DRUM BRAKES IN YOUR TRUCK?

DISCONNECT

DIS-CON-NECT

TO TAKE APART A CONNECTION

HE DISCONNECTED THE HEATER HOSE.

DISTRIBUTOR

DIS-TRIB-U-TOR

A COMPONENT OF THE IGNITION SYSTEM THAT OPENS AND CLOSES THE PRIMARY CIRCUIT; THE DISTRIBUTOR ALSO DISTRIBUTES (DIVIDES OUT) SECONDARY CIRCUIT VOLTAGE TO THE SPARK PLUG

THE DISTRIBUTOR PROVIDES ELECTRICAL CURRENT TO THE CLYINDERS.

DISTORTION

DIS-TOR-TION

A TWISTING OR BENDING CONDITION

THERE IS SOME DISTORTION IN THE GLASS OF THE FRONT WINDSHIELD.

DRIVE SHAFT

DRIVE SHAFT

THE PART CONNECTING THE TRANSMISSION TO THE DRIVING AXLE

THE DRIVE SHAFT IS ALSO CALLED THE PROPELLER SHAFT.

DWELLMETER

DWELL-ME-TER

AN ELECTRICAL INSTRUMENT THAT MEASURES THE TIME THE IGNITION POINTS ARE CLOSED; IT MEASURES THE TIME IN DEGREES OF DISTRIBUTOR CAM ROTATION.

ADJUST THE DWELLMETER TO TEST A SIX-CYLINDER ENGINE.

ECCENTRIC

EC-CEN-TRIC

OFF CENTER

THE RING AND PINION GEARS FORM ECCENTRIC CIRCLES.

EMISSIONS

E-MIS-SIONS

COMBUSTION AND FUEL VAPORS THAT ESCAPE INTO THE ATMOSPHERE

AUTO EMISSIONS COME FROM ENGINE EXHAUST, FUEL EVAPORATION, AND CRANKCASE VAPORS.

ENGINE

EN-GINE

A DEVICE THAT PRODUCES POWER BY BURNING FUEL; IT CHANGES HEAT ENERGY TO MECHANICAL ENERGY.

DO YOU PREFER THE V-8 OR THE V-6 ENGINE?

EXHAUST MANIFOLD

EX-HAUST MAN-I-FOLD

THE PASSAGES THAT EXHAUST TRAVELS THROUGH FROM THE CYLINDERS TO THE EXHAUST PIPE

INSPECT THE EXHAUST MANIFOLD FOR ANY LEAKS.

FAN

FAN

AN AIR BLOWER THAT COOLS THE AIR AROUND THE ENGINE; A DEVICE THAT ROTATES AND BLOWS AIR

THE HEATER FAN IN MY CAR DOESN'T WORK.

FAN BELT ("V" BELT)

FAN BELT

A V-SHAPED, CONTINUOUS BELT THAT DRIVES THE ENGINE FAN AND THE WATER PUMP

MANY ENGINES USE TWO V BELTS OR FAN BELTS.

FILTER

FIL-TER

A DEVICE TO STRAIN OR REMOVE DIRT OR OTHER IMPURITIES FROM AIR, GAS, OR LIQUIDS

HOW OFTEN SHOULD YOU CHANGE THE OIL FILTER?

FIRING ORDER

FIR-ING OR-DER

THE SEQUENCE OR ORDER IN WHICH THE ENGINE CYLINDERS FIRE

THE BEST ENGINE DESIGN DISTRIBUTES THE PATTERN OF THE FIRING ORDER ALONG THE CRANKSHAFT.

FLAMMABLE

FLAM-MA-BLE

ABLE TO BE SET ON FIRE

OILY RAGS ARE EXTREMELY FLAMMABLE.

FLOAT

FLOAT

A DEVICE THAT CONTROLS THE FUEL LEVEL IN THE CARBURETOR

THE CARBURETOR FLOAT WAS STUCK.

FLYWHEEL

FLY-WHEEL

A HEAVY METAL WHEEL ATTACHED TO A CRANKSHAFT; IT SMOOTHS OUT THE SURGES FROM THE ENGINE POWER STROKES

THE FLYWHEEL IS ALSO PART OF THE CLUTCH AND STARTING SYSTEM.

FUEL PUMP

FU-EL PUMP

THE DEVICE THAT FORCES FUEL FROM THE FUEL TANK TO THE CARBURETOR

MOST MODERN V-8 ENGINES HAVE THE FUEL PUMP ON THE SIDE OF THE CYLINDER BLOCK.

FUMES

FUMES

HEAVY STRONG-SMELLING AIR, SMOKE, GAS, ETC., GIVEN OFF INTO THE ATMOSPHERE

GASOLINE FUMES CAN POISON THE AIR.

FUSE

FUSE

AN ELECTRICAL SAFETY DEVICE

IF THERE IS TOO MUCH CURRENT, A FUSE WILL "BLOW", OR MELT, AND THE CIRCUIT BREAKS.

GAP

GAP

AN EMPTY SPACE BETWEEN TWO PARTS OR OBJECTS

SPARK GAP IS THE SPACE BETWEEN THE CENTER AND SIDE ELECTRODE TIPS ON A SPARK PLUG.

GASKET

GAS-KET

A LINING OR LAYER OF MATERIAL BETWEEN TWO PARTS TO MAKE A TIGHT OR LEAKPROOF SEAL

GASKETS MAY BE MADE OF CORK OR METAL OR BOTH.

GAUGE

GAUGE

A DEVICE USED FOR MEASUREMENTS (OIL PRESSURE, TEMPERATURE, ETC.)

WHILE JOE WAS DRIVING, THE OIL PRESSURE GAUGE INDICATED NORMAL PRESSURE.

GENERATE

GEN-ER-ATE

TO PRODUCE (ELECTRICITY)

THE ALTERNATOR GENERATES ALTERNATING CURRENT.

GENERATOR

GEN-ER-A-TOR

A DEVICE THAT PRODUCES ELECTRICAL ENERGY

(SEE ''ALTERNATOR'')

GROUND

GROUND

A CONNECTION BETWEEN AN ELECTRICAL CIRCUIT AND THE GROUND; A RETURN ROUTE IN AN ELECTRICAL CIRCUIT

THE AUTOMOBILE FRAME, BODY, AND ENGINE ARE USED AS A GROUND IN THE RETURN CIRCUIT.

HAZARDOUS

HAZ-ARD-OUS

DANGEROUS

AUTO MECHANICS HANDLE HAZARDOUS EQUIPMENT AND MATERIALS.

HEATER

HEAT-ER

A COMPONENT THAT HEATS AIR FLOWN INTO THE PASSENGER COMPARTMENT OF A VEHICLE

WHEN IT IS COLD OUTSIDE, WE OFTEN TURN ON THE CAR'S HEATER.

HONE

HONE

TO SHARPEN, MAKE LARGER, OR SMOOTH WITH A FINE ABRASIVE STONE

MR. RODRIGUEZ HONED THE CYLINDER WALLS.

HOUSING

HOUS-ING

A CASE OR CONTAINER FOR ENCLOSING OR COVERING UP PARTS

THE BELL HOUSING PROTECTS THE CLUTCH AND FLYWHEEL ASSEMBLY.

HYDRAULIC

HY-DRAU-LIC

A FLUID UNDER PRESSURE THAT OPERATES A MECHANICAL DEVICE; A METHOD OF TRANSMITTING MOTION

OIL IS ONE KIND OF HYDRAULIC FLUID.

HYDROMETER

HY-DROM-E-TER

AN INSTRUMENT USED TO MEASURE SPECIFIC GRAVITY OF BATTERY ELECTROLYTE

THE HYDROMETER MEASURES THE STATE OF THE BATTERY CHARGE.

I.D.

I.D.

ABBREVIATION FOR "INSIDE DIAMETER"

WHAT IS THE I.D. OF THE CYLINDERS?

IDLE SPEED

I-DLE SPEED

THE SLOWEST ENGINE OPERATING SPEED

ADJUST THE IDLE SPEED ON THAT 1978 FORD.

IGNITION

IG-NI-TION

THE START OF THE BURNING OF THE COMPRESSED AIR-FUEL MIXTURE IN THE COMBUSTION CHAMBERS

MS. TOMASI PUT IN A NEW SWITCH IN THE IGNITION.

INSPECT

IN-SPECT

TO EXAMINE WITH CARE

DID YOU INSPECT THE BATTERY CABLES?

INSTALL

IN-STALL

TO SET UP, READY FOR USE

THEY INSTALLED A NEW BATTERY AT THE GARAGE.

INSULATION

IN-SU-LA-TION

A MATERIAL THAT DOES NOT CONDUCT ELECTRICITY

THERE IS NOT ENOUGH INSULATION AROUND THOSE WIRES.

INTAKE MANIFOLD

IN-TAKE MAN-I-FOLD

THE SYSTEM OF PASSAGES THAT CONNECTS THE CARBURETOR TO THE ENGINE CYLINDERS

THE CARBURETOR IS MOUNTED ON THE INTAKE MANIFOLD.

LEAK

LEAK

A SMALL ACCIDENTAL HOLE OR CRACK WHICH LETS LIQUID OR GAS ESCAPE

IS THERE A LEAK IN THE RADIATOR?

LINKAGE

LINK-AGE

A SYSTEM OF MOVABLE RODS AND LEVERS USED TO CONNECT PARTS

LINKAGE CAN TRANSMIT MOTION OR FORCE.

LUBRICATE

LU-BRI-CATE

TO MAKE SMOOTH AND ABLE TO MOVE EASILY BY ADDING A LUBRICANT (USUALLY OIL)

CAN YOU LUBRICATE THE ENGINE BEFORE FIVE O'CLOCK TODAY?

MECHANIC

ME-CHAN-IC

A PERSON SKILLED IN USING AND REPAIRING MACHINES

AUTO MECHANICS DIAGNOSE AND FIX PROBLEMS WITH AUTOMOBILES.

MICROMETER

MI-CROM-E-TER

A DEVICE USED TO MEASURE ACCURATELY TO ONE ONE THOUSANDTH (.001) OF AN INCH

GEORGE MEASURED THE DIAMETER OF THE PISTONS WITH THE MICROMETER.

MOTOR

MO-TOR

A DEVICE THAT CHANGES ELECTRICAL ENERGY TO MECHANICAL ENERGY

THE MOTOR IS IDLING.

MOUNT

MOUNT

A PART ON WHICH AN ENGINE IS PLACED

PUT THE ENGINE ON THE MOUNT.

MUFFLER

MUF-FLER

A DEVICE USED TO SILENCE THE NOISE OF ENGINE EXHAUST GASES

THE LAW SAYS YOU MUST HAVE A MUFFLER ON YOUR CAR.

OHM

OHM

A UNIT FOR MEASURING ELECTRICAL RESISTANCE

A PRESSURE OF 1 VOLT IS REQUIRED TO SEND A CURRENT OF 1 AMPERE THROUGH A RESISTANCE OF 1 OHM.

OHMMETER

OHM-ME-TER

AN INSTRUMENT THAT MEASURES RESISTANCE IN OHMS

THE BATTERY IN THE OHMMETER PUSHES CURRENT THROUGH A PART BEING TESTED.

OVERHAUL

O-VER-HAUL

TO EXAMINE WITH CARE AND REPAIR IF NECESSARY

RAUL WILL OVERHAUL THE ENGINE TOMORROW.

PISTON

PIS-TON

A MOVABLE PLUG THAT FITS IN A CYLINDER

THE PISTONS IN THE ENGINE RECEIVE AND TRANSMIT MOTION.

POWER STEERING

POW-ER STEER-ING

A STEERING SYSTEM THAT USES HYDRAULIC PRESSURE TO MAKE STEERING EASIER FOR THE DRIVER

DOES YOUR NEW CAR HAVE POWER STEERING?

-PROOF

-PROOF

GIVING OR HAVING PROTECTION AGAINST SOMETHING HARMFUL OR UNWANTED (EXAMPLES: WATERPROOF, SHOCKPROOF, FIREPROOF)

THE MECHANICS WEAR SPLASH-PROOF GOGGLES WHEN THEY TEST RADIATORS.

PULLEY

PUL-LEY

A DEVICE CONSISTING OF A WHEEL OVER WHICH A BELT, ROPE, OR CHAIN CAN BE MOVED

TIM ADJUSTED THE PULLEY IN THE WATER PUMP.

QUICK CHARGER

QUICK CHARG-ER

A DEVICE WHICH PRODUCES A VERY HIGH CURRENT TO CHARGE A BATTERY IN A SHORT TIME

SHE SAVED A LOT OF TIME BY USING THE QUICK CHARGER.

RACK AND PINION STEERING GEAR

RACK AND PIN-ION STEER-ING GEAR

A STEERING GEAR WITH A SMALL PINION GEAR ON THE END OF THE STEERING SHAFT THAT MOVES A LONG TOOTHED BAR, CALLED THE RACK GEAR

TIE RODS ATTACH THE RACK GEAR TO THE STEERING ARMS IN THE RACK AND PINION STEERING GEAR.

RADIATOR

RA-DI-A-TOR

A DEVICE WHICH TAKES ENGINE HEAT AND RELEASES THE HEAT INTO THE AIR

CAR RADIATORS SOMETIMES OVERHEAT IN THE SUMMER.

REASSEMBLE

RE-AS-SEM-BLE

TO PUT SOMETHING BACK TOGETHER

PLEASE REASSEMBLE THE CARBURETOR AFTER YOU FIND A REPLACEMENT FLOAT.

RECIPROCATING

RE-CIP-RO-CAT-ING

UP AND DOWN

THE CRANKSHAFT CHANGES THE RECIPROCATING MOTION OF THE PISTONS TO ROTATING MOTION.

RECIRCULATING BALL AND NUT STEERING GEAR

RE-CIR-CU-LAT-ING BALL AND NUT STEER-ING GEAR

A POPULAR STEERING SYSTEM THAT USES BALL BEARINGS TO CONNECT THE WORM GEAR TO THE BALL NUT

IN THE RECIRCULATING BALL AND NUT STEERING GEAR, THE BALLS PROVIDE ROLLING FRICTION BETWEEN THE WORM GEAR AND THE BALL NUT.

RECONDITION

RE-CON-DI-TION

TO REPAIR AND BRING BACK INTO WORKING ORDER

MR. WONG IS GOING TO RECONDITION THE ENGINE OF HIS CHEVY.

RECTIFIER

REC-TI-FI-ER

A DEVICE USED TO CHANGE AC TO DC; ALSO CALLED DIODE RECTIFIER

ONE TYPE OF RECTIFIER IS THE SILICON DIODE.

RELAY

RE-LAY

AN ELECTROMAGNETIC SWITCH TO OPEN OR CLOSE A CIRCUIT

THE VOLTAGE SIGNAL MAKES THE RELAY WORK.

REMOVE

RE-MOVE

TO TAKE OUT OR AWAY

DID YOU <u>REMOVE</u> THE BURNED OUT FUSE?

REPAIR

RE-PAIR

TO MEND OR FIX

THE MECHANICS <u>REPAIRED</u> THE DAMAGE FROM THE ACCIDENT.

RESISTANCE

RE-SIST-ANCE

THE ABILITY OF AN ELECTRICAL CONDUCTOR TO RESTRICT (HOLD BACK) THE FLOW OF CURRENT

GLASS HAS HIGH <u>RESISTANCE</u> TO ELECTRICITY.

ROTOR

RO-TOR

A REVOLVING (ROTATING) PART OF A MACHINE

<u>ROTORS</u> DISTRIBUTE CURRENT TO MANY CONNECTIONS.

SCORE

SCORE

A SCRATCH OR GROOVE

<u>SCORES</u> ARE OFTEN FOUND ON CYLINDER WALLS.

SERVICE

SER-VICE

TO REPAIR OR PUT IN GOOD CONDITION

MANY PEOPLE PREFER TO SERVICE THEIR OWN CARS.

SHIELD

SHIELD

TO PROTECT FROM DANGER OR HARM

WELDERS SHIELD THEIR EYES WITH SPECIAL GOGGLES (GLASSES).

SHIM

SHIM

A PIECE OF METAL USED TO ADJUST THE DISTANCE BETWEEN TWO PARTS

HE USED A SHIM WHEN HE ALIGNED THE FRONT END OF THE CAR.

SHOCK ABSORBER

SHOCK AB-SORB-ER

A DEVICE BY EACH VEHICLE WHEEL TO CONTROL THE UP AND DOWN MOVEMENT OF A SPRING

I NEED NEW SHOCK ABSORBERS FOR MY TRUCK.

SHORT CIRCUIT

SHORT CIR-CUIT

A DEFECT (PROBLEM) IN AN ELECTRICAL CIRCUIT THAT LETS CURRENT RETURN TO THE POWER SOURCE BEFORE IT PASSES THROUGH THE COMPLETE PATH

DAMAGED WIRES CAN CAUSE SHORT CIRCUITS.

SLUDGE

SLUDGE

A BUILD-UP OF WATER, DIRT, AND OIL IN THE OIL PAN

SLUDGE REDUCES LUBRICATION.

SOLENOID

SO-LE-NOID

AN ELECTROMAGNET WITH A MOVABLE IRON CORE

SOLENOIDS ARE USED IN SWITCHES.

SOLVENT

SOL-VENT

A LIQUID ABLE TO DISSOLVE A SOLID SUBSTANCE

GASOLINE IS A FLAMMABLE SOLVENT.

SPARK PLUG

SPARK PLUG

A DEVICE IN THE CYLINDER HEAD THAT PROVIDES A SPARK TO IGNITE THE FUEL IN THE COMBUSTION CHAMBER

SPARK PLUGS NEED FREQUENT SERVICE AND REPLACEMENT.

SPECIFIC GRAVITY

SPE-CIF-IC GRAV-I-TY

THE WEIGHT OF A SUBSTANCE COMPARED WITH THE WEIGHT OF AN EQUAL VOLUME OF WATER

WHAT IS THE SPECIFIC GRAVITY OF THE ELECTROLYTE?

SPECIFIED

SPEC-I-FIED

NAMED EXACTLY

THE SPECIFIED TIRE PRESSURE FOR THIS CAR IS 24 PSI (POUNDS PER SQUARE INCH).

SPEEDOMETER

SPEED-OM-E-TER

AN INSTRUMENT THAT INDICATES VEHICLE SPEED

THE SPEEDOMETER READS 50 MPH (MILES PER HOUR).

STEERING GEAR

STEER-ING GEAR

A COMPONENT THAT CHANGES THE ROTATING MOTION OF THE STEERING WHEEL TO LATERAL (SIDE TO SIDE) MOTION

THE TWO MOST COMMON TYPES OF STEERING GEAR ARE RECIRCULATING BALL AND NUT, AND RACK AND PINION.

SUSPENSION

SUS-PEN-SION

THE SYSTEM THAT HOLDS THE WHEELS OF A CAR IN THEIR CORRECT RELATIONSHIP TO THE VEHICLE AND THE ROAD

THE MOST COMMON TYPE OF SUSPENSION IS THE LONG AND SHORT ARM SUSPENSION SYSTEM.

TACHOMETER

TA-CHOM-E-TER

A DEVICE FOR MEASURING ENGINE SPEED, OR RPM (REVOLUTIONS PER MINUTE)

MOST SHOPS USE AN INSTRUMENT THAT COMBINES A TACHOMETER WITH DWELL METER: TACH-DWELL METER.

TAPER

TA-PER

A CYLINDER DEFECT IN WHICH ONE END HAS A LARGER BORE THAN THE OPPOSITE END

THE USUAL MEANING OF TAPER IS A LACK OF PARALLELISM.

THROTTLE

THROT-TLE

THE VALVE IN THE CARBURETOR THAT CONTROLS THE FLOW OF FUEL-AIR MIXTURE INTO THE INTAKE MANIFOLD

THE THROTTLE CONTROLS ENGINE SPEED.

TIMING

TIM-ING

IN AN ENGINE, THE DELIVERY OF THE IGNITION SPARK OR OPERATION OF THE VALVES FOR THE POWER STROKE AT THE CORRECT TIME

A TIMING LIGHT IS USED FOR ADJUSTING THE TIMING OF THE IGNITION SPARK.

TORQUE

TORQUE

TURNING OR TWISTING EFFORT

YOU CAN TIGHTEN NUTS AND BOLTS TO A SPECIFIC TORQUE.

TOXIC

TOX-IC

POISONOUS

THERE ARE TOXIC FUMES IN CAR EXHAUST.

TRANSMISSION

TRANS-MIS-SION

A SYSTEM OF GEARS TO ADJUST ENGINE SPEED OR POWER TO ALL DRIVING SITUATIONS

KIM PREFERS A MANUAL TRANSMISSION TO AN AUTOMATIC TRANSMISSION.

UNIVERSAL JOINT (U-JOINT)

U-NI-VER-SAL JOINT

A CONNECTION THAT LETS POWER BE TRANSMITTED THROUGH AN ANGLE

A UNIVERSAL JOINT, OR U-JOINT, CAN CONNECT THE DRIVE SHAFT TO THE DIFFERENTIAL.

VACUUM

VAC-U-UM

A PRESSURE LESS THAN THE PRESSURE OF THE ATMOSPHERE

THERE IS A VACUUM IN THE INTAKE MANIFOLD.

VALVE

VALVE

A MOVABLE PLUG OR DOOR THAT ALLOWS OR STOPS THE FLOW OF A LIQUID OR GAS

MOST ENGINES HAVE TWO VALVES FOR EACH CYLINDER.

VEHICLE

VE-HI-CLE

SOMETHING IN OR ON WHICH PEOPLE OR THINGS CAN BE CARRIED, ESPECIALLY ON ROADS

CARS, TRUCKS, AND BUSSES ARE ALL MOTOR VEHICLES.

VENTILATION

VEN-TI-LA-TION

FRESH AIR PASSING INTO AND AROUND A ROOM OR BUILDING

YOU NEED GOOD VENTILATION WHEN YOU ARE TESTING THE EXHAUST SYSTEM.

VISCOSITY

VIS-COS-I-TY

A MEASUREMENT OF THE ABILITY OF A LIQUID TO FLOW

OIL WITH A HIGH VISCOSITY FLOWS SLOWLY.

VOLT

VOLT

A UNIT OF MEASUREMENT OF ELECTRICAL PRESSURE

AUTOMOTIVE BATTERIES USUALLY HAVE 12 VOLTS.

VOLTMETER

VOLT-ME-TER

AN INSTRUMENT THAT MEASURES ELECTRICAL PRESSURE IN VOLTS

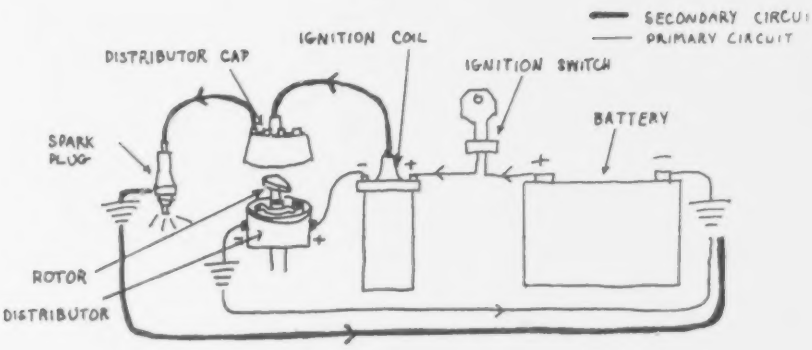
ANNA READ THE VOLTAGE WITH A VOLTMETER.

WATER JACKETS

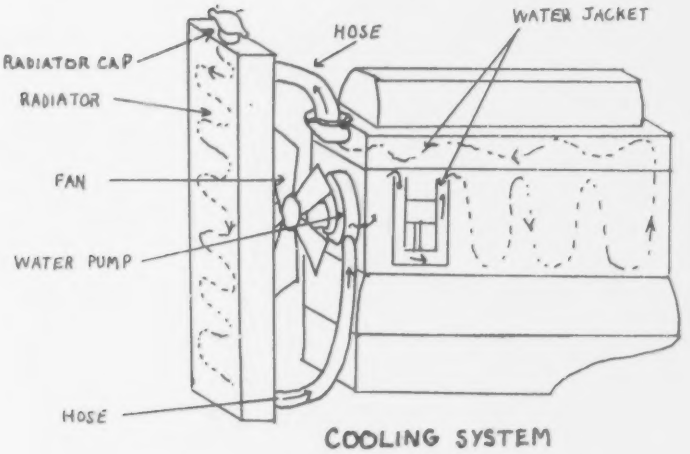
WA-TER JACK-ETS

THE SPACES AROUND THE CYLINDERS AND COMBUSTION CHAMBERS WHERE COOLANT FLOWS

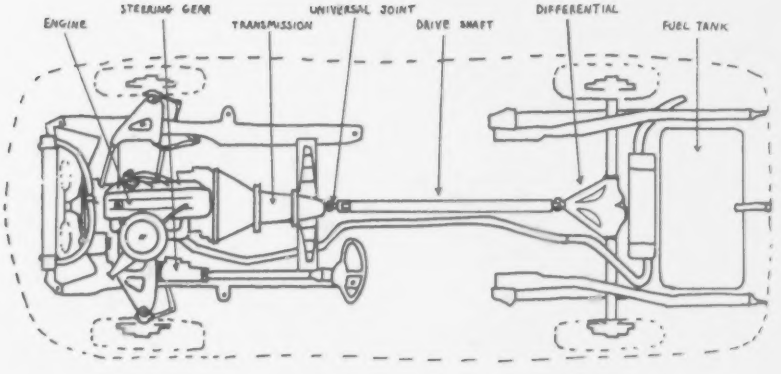
WATER JACKETS ALLOW COOLANT TO REMOVE EXCESS HEAT AND COOL THE ENGINE.



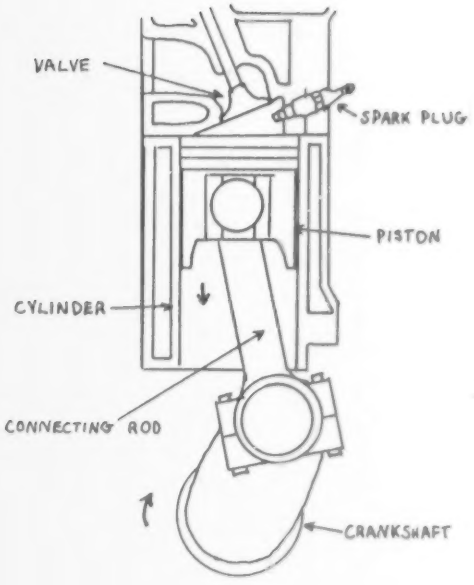
IGNITION SYSTEM



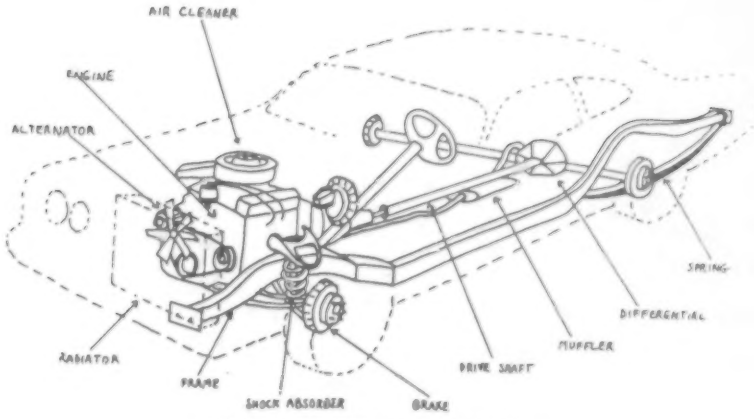
COOLING SYSTEM



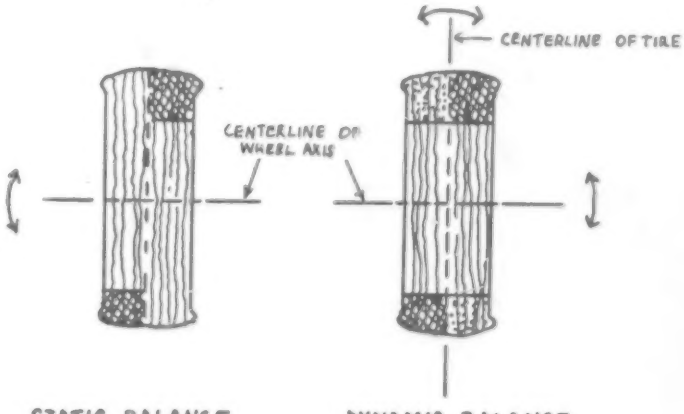
POWER TRAIN OF THE AUTOMOBILE



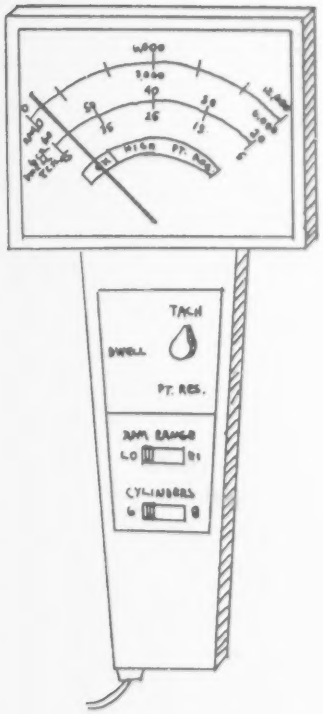
FOUR-STROKE CYCLE ENGINE



MAJOR COMPONENTS IN THE AUTOMOBILE



STATIC BALANCE DYNAMIC BALANCE



TACH-DWELL METER

▼ = DWELL ANGLE

DWELL AND POINT GAP ARE RELATED